HISOBLASH TEXNIKASINING RIVOJLANISH TARIXI VA AVLODLARI

MA’RUZA MATNI

REJA

1. Elektron hisoblash mashinalarining (EHM) rivojlanish tarixi.
2. Elektron hisoblash mashinalarining avlodlari.
3. Shaxsiy kompyuterlar yaratishga bo‘lgan urinishlar.
4. Nazorat savollari.

Adabiyotlar:

1. CT.Fundamentals of Information Systems.Ralph Stair, George Reynolds. 2012.

2. Learn Office 2011 for Mac OS X Copyright © 2010 by Guy Hart-Davis

3. IT Essentials: PC Hardware and Software Companion Guide Third Edition David Anfinson • Ken Quamme Copyright© 2008 Cisco Systems, Inc

4. Katherine Murray. First Look 2007 Microsoft OFFICE System. - Washington, 2012.

5. Computer networks / Andrew S. Tanenbaum, David J. Wetherall. -- 5th ed. -Boston, 2011.

6. Pushkar O., Sibilyev K. Information systems and technologies. Textbook -ХарКiВ:Вид. ХНЕУ, 2012. -264 p.

7. Aripov M.M., Muhammadiev J.O’. Informatika, informastion texnologiyalar: OO’Yu talabalari uchun darslik. -T.: Navoiy nomidagi O’zbekiston Milliy kutubxonasining bosmaxonasi, 2004.-276 b.

8. Sattorov A. Informatika va axborot texnologiyalari. Akademik listey va kasb-hunar kollejlari uchun darslik. -T.: “O’qituvchi”, 2002 y. - 256 b.

9. R.X.Alimov , G.T.Yulchiyeva , O.G.Rixsimboyev, Sh.A.Alishov. Axborot texnologiyasi va tizimlari (talabalar uchun darslik). -Toshkent, 2011.

8. O.O.Hoshimov, M.M.Tulyaganov. Kompyuterli va raqamli texnologiyalar

(Talabalar uchun darslik). -Toshkent, 2009.

9. R.X.Ayupov. Excel jadval hisobligichida iqtisodiy va moliyaviy masalalarni yechish. -Toshkent: Tafakkur-Bo‘stoni, 2012.

10. Radjabov B.SH., Samigova G.A., Masharipov M.R. Microsoft OFFICE 2010. Uslubiy qo’llanma O‘zDSMI. -T., 2015.

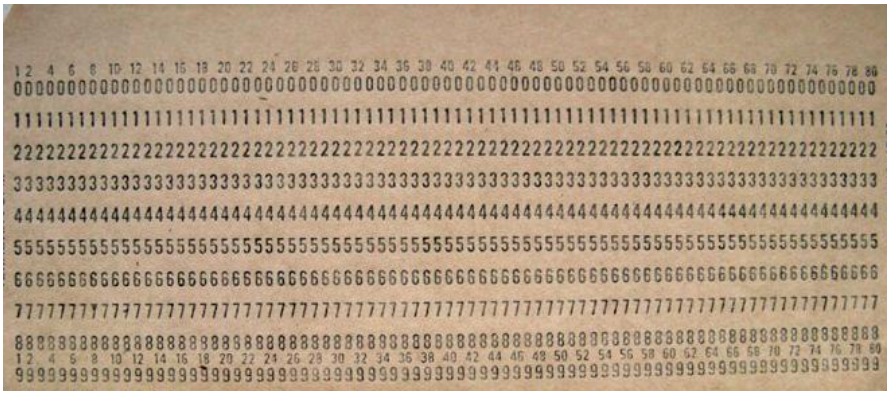
Insoniyat turmush tarzining rivojlanishi yangidan yangi kashfiyotlarning yaratilishiga sabab bo‘lmoqda. Inson yangilik yaratish jarayonida har xil to‘siqlarga duch keladi va shu to‘siqlarni yengib o‘tish mobaynida yana yangi ixtirolar vujudga kelaveradi. Lekin, hayot tajribalaridan ma'lumki, ko‘pincha yangi kashfiyot ma'lum bir muammoni hal qilish jarayonida vujudga keladi.Biz so‘zsiz kompyuterning XX asrning buyuk kashfiyotlaridan biri desak yanglishmaymiz.Davr talabiga ko‘ra bugunga kelib kompyuter texnologiyasi juda rivojlanib ketdi.Ma’lumotlarni boshqarish, ayniqsa, hozirgi kunda muhim ahamiyat kasb etmoqda. Ma’lumotlarni boshqarish tizimlariga bo‘lgan talab kun sayin ortib bormoqda. Bunga sabab barcha sohalarda biror bir qaror qabul qilish uchun katta hajmdagi ma’lumotlar bazasi va axborotlar ustida ishlashga to‘g‘ri kelyapti. Jamiyat taraqqiyotida yuz berayotgan jadal o‘zgarishlar uning bir qismi bo‘lgan informatika sohasiga ham o‘z ta’sirini ko‘rsatmoqda. Bu ta’sir shunchalik kuchliki, axborot texnologiyalarida bo‘layotgan o‘zgarishlar yillar ichida emas, balki oylar ichida o‘zgarib, rivojlanib bormoqda. Qisqa vaqt mobaynida axborot texnologiyalari sohasida juda katta yutuq va o‘zgarishlar amalga oshirildi. Yangi axborot texnologiyalarining yoki kompyuter texnologiyalarining paydo bo‘lishi bu sohadagi xizmat qilish uslubini tubdan o‘zgartirdi.

Komputerlarning yaratilish tarixiga nazar tashlasak, quyidagilarni esga olish mumkin. Insonlar qadim zamonlardan boshlab hisoblash ishlarida duch kelinayotgan qiyinchiliklarni yengillashtirish ustida bosh qotirib, tinmay izlanib, asta-sekin bu muammoni echa boshlashgan. Dastlab, hisoblash quroli sifatida qo‘l barmoqlaridan foydalanila boshlangan. Keyinchalik hisoblashni yog‘och tayoqchalari yordamida bajarishgan. Xitoy, Hindiston va Sharqning boshqa mamlakatlarida

sonlarni yozish va hisoblash ishlarini bajarish uchun qadimgi hisoblash asboblaridan biri bo‘lgan abak hisoblash taxtasidan foydalanishgan.

XVII asrda logarifm yaratildi va shundan keyin yangi hisoblash asbobi – logarifmik chizg‘ich kashf etildi. Ana shular bilan bir vaqtda Shikkard, Paskal va Leybnitslarning hisoblash mashinalari dunyoga keldi. 1642 yilda fransuz olimi Blez Paskal yaratgan jamlash mashinasi birinchi hisoblash mashinasi deb qabul qilingan. Undan sal kam 200 yil o‘tib, 1820 yili fransuz olimi Sharl de Kolmar sonlar ustida ko‘paytirish va bo‘lish amallarini bajaruvchi arifmometrni kashf etdi. Bu qurilma buxgalterlar stolidan o‘rin oldi. Mexanik arifmometr murakkab masalalarni yechadigan matematik mashinalarning paydo bo‘lishiga asos soldi [1, 10-11 p].

1833 yili ingliz matematigi Charlz Bebbij tomonidan ilmiy va texnik hisoblarda ishlatiladigan hisoblash mashinalarini loyihasini yaratdi. Uning loyihasiga ko‘ra hisoblash mashinasi darsturiy boshqarilishi kerak edi. Hisoblash mashinasiga ma’lumotlarni kiritish uchun ma’lumot yo‘zilgan qattiq qog‘oz bo‘lagi – perfokartalardan foydalanishni taklif qilingan. Bu paytda perfokartalar to‘qimachilik sanoatida ishlatilar edi. Perfokartalarga ma’lumotlar kodlangan holatda perforatorlar bilan kichik to‘rtburchakli teshikcha qilish orqali kiritilishi kerak edi. Lekin yetarli darajada texnika bazasi bo‘lmaganligi tufayli Bebbidj bu ajoyib mashinani oxirigacha etkazishga muyassar bo‘la olmadi. Bebbijning bu g‘oyasi 19-asrga kelib amalga oshdi. 1888 yili amerikalik muhandis German Xollerit birinchi elektromexanik hisoblash mashinasini loyihalashtirdi. Bu mashina “Tabulyator” deb nomlanib, perfokartadagi ma’lumotlarni o‘qish va tartiblashtirish amallarini bajarardi.



Rasm 2.1. Perfokarta

1890 yili Xolleritning bu mashinasidan 11-amerika aholini ro‘yxatga olish jarayonida ishlatildi. Aholini ro‘yhatga olish jarayoni odatda 500 ta ishchi bilan 7 yil ichida bajarilardi. Xollerit mashinasi yordamida esa bu ish 43 ta ishchi va bir oy muddatda bajarildi.

1896 yil German Xollerit “Computing Tabulating Recording Company” nomli firma tashkil etdi. Hozirda bu firma dunyoga dong‘i taralgan mashhur “International Business Machines Corporation” – IBM korparatsiyasi nomi bilan yuritiladi. IBM korparatsiyasi kompyuter texnikaning rivojiga juda katta hissa qo‘shdi.

Ilmiy-texnik rivojlanishning keyingi davri 1940 yillarda yaratilgan birinchi hisoblash mashinalari bilan boshlandi. Nemis muhandisi Konrada Suze “Z1” deb nomlanuvchi birinchi dasturiy boshqariluvchi hisoblash mashinasini yaratdi.

Bundan tashqari rus olimlari V.Bunyakovskiy va P.L.Chebishevlar yaratgan qurilma hisoblash texnikasining taraqqiyoti uchun muhim ahamiyat kasb etdi. Taniqli ingliz olimi Bebbidjning mexanik arifmometr yaratishi XIX asrning yana bir kashfiyoti bo‘ldi.

XX asrning 30-40 yillarida ikkilik va o‘nlik sanoq tizimlardan foydalanib, elektromexanik relelar asosida dasturlanadigan hisoblash mashinalari yaratishga urinib ko‘rildi. 1944 yilda amerikalik muhandis Govvard Eytken “Mark 1” deb nomlanuvchi hisoblash mashinasini yaratdi.Bu hisoblash mashinasi katta xonaga

joylashgan va ko‘p miqdorda energiya iste’mol qilar edi. Bu mashina bilan elektromagnit elementlar bazasida hisoblash mashinalari yaratish imkoniyati uzil-kesil hal bo‘ldi.Lekin elektromexanik relelar yetarlicha tez ishlamas edi.

Bu mashinaning konstruktsiyasini tahlil qilish asosida amerikalik matematik J.Fon Neyman EHM yaratishning asosiy tamoyillarini, shu jumladan, ikkilik sanoq tizimidan foydalanish va dasturni tezkor xotirada saqlash tamoyillarini ilgari surdi.

1946 yili AQSh armiyasi buyurtmasi bilan birinchi keng mashtabli elektron hisoblash mashinasi ENIAK yaratildi. Uni amerikalik olimlar Djon Uilyam Mokli va Djon Presper Ekertlar yaratdi. Bu hisoblash mashinasining asosini vakuumli elektron lampalar tashkil etardi.Shuning uchun ularni elektron hisoblash mashinasi – EHM deb ataldi. EHMda 17468 ta elektron lampa, 7200ta kremniydan tayyorlargan diodlar, 1500 ta rele, 70000 ta resistor va 10000 ta kondensatorlar ishlatilgan. Energiya sarfi 150kBt edi.Hisoblash quvvati esa sekundiga 300 ko‘paytirish amalini, 500 qo‘shish amalini bajarar edi.Ogirligi 27 tonnani tashkil etardi. ENIAKdan asosan ballistik jadvallarni hisoblashda, obi-havo ma’lumotlarini oldindan aytib berishda, atom energetikasi, aerodinamika va kosmos tadqiqotlari hisob kitoblarini bajarishda foydalanilar edi [1, 83 p].

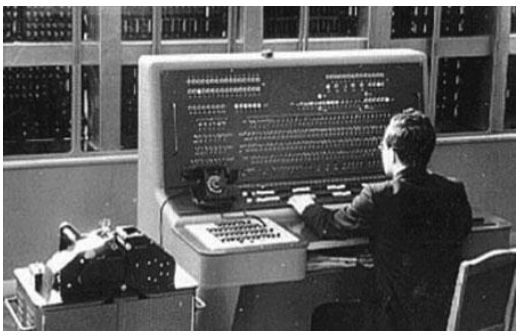
Sobiq ittifoqda elektron sanoq mashinasi akademik. Sergey Alekseyevich Lebedev rahbarligida 1951 yili Ukraina FA "Elektronika" institutida yaratildi va MESM (kichik elektron sanoq mashinasi) deb nom oldi. 1954 yili aniq mexanika va hisoblash texnikasi institutida S.A. Lebedev rahbarligida BESM (Katta elektron sanoq mashinasi) yaratildi, u 2048 ta xotira yacheykasiga ega bo‘lib, sekundiga 9 ming amalni bajarar edi. Usha vaqtda "BESM" jahondagi eng tezkor mashina edi.

EHMlar qisqa vaqt ichida juda katta rivojlanishni boshidan kechirdi. Shuning uchun EHMlarning rivojlanish taraqqiyotida ularni avlodlarga ajratish qabul qilingan bo‘lib, bu avlodlarning har biri EHMlarni asosini tashkil etuvchi elementlarning tayyorlanish texnologiyasi, jihozlarining parametrlari, shuningdek hal etadigan masalalari va dasturi bilan ajralib turadi.

Ko‘rsatkich	EHM avlodlari			
	Birinchi avlod 1950-1960 yillar	Ikkinchiavlod 1960-1970 yillar	Uchinchi avlod 1970-1980-йиллар	To‘rtinchi avlod 1980-1990 yillar
Protsesor asosini tashkil etuvchi element	Elektron lampalar	Yarim o‘tkazgichlar (Transistorlar)	Kichik integral sxemalar	Katta integral sxemalar O‘ta katta integral sxemalar
Tezkor xotirani asosini tashkil etuvchi element	Elektron nur trubkalar	Ferrit halqachalar	Kremniy kristallar	Katta integral sxemalar O‘ta katta integral sxemalar
Asosiy kiritish qurilmasi	Perfokartali va perfolentali kiritish pulti	Alfavit raqamli display, klaviatura		Rangli grafik displeylar, klaviatura va sichqoncha
Asosiy chiqarish qurilmasi	Alfavit-raqamli chiqarish qurilmasi, perfolenta		Grafopostroitel, printer	
Tashqi xotira	Magnit lentalar, barabanlar, perfokartalar va perfolentalar	Magnit disklar	Perfolentalar, diametric 30 sm bo‘lgan magnit disklar	Magnit va optik disklar

Tezkor xotiraning hajmi, baytda	10^1	10^2	10^4	10^5 - 10^7
Protsessorning ishlash tezligi (amal/cekundiga)	10^4	10^6	10^7	10^8 - 10^9 ko‘p prosessorlik
Dasturlash tillari	Universal dasturlash tillari, translyatorlar (mashina kodi)	Operatsion sistemlar, optimallashtiruvchi translyatorlar (Assembler, Fortran)	Yuqori darajali dasturlash tillari	Yuqori darajali dasturlash tillari
Foydalanish maqsadi	Ilmiy texnik hisoblar uchun	Texnik va iqtisodiy hisob-kitoblar	Boshqarish va iqtisodiy hisob-kitoblar	Tele-kommunikatsiya axborot xizmati

Birinchi avlod mashinalari 1950-1960 yillarda ishlab chiqarilgan bo‘lib, asosiy tashkil etuvchilari elektron lampalar bo‘lgan. Bu EHMlar minglab lampalardan tashkil topib, ko‘plab elektr energiya sarfini talab qilgan, ko‘p miqdorda issiqlik ajratib chiqargan va katta joyni egallagan. Bu mashinalarning amal bajarish tezligi past, xotira sig‘imi kichik va tez-tez buzilib turgan. Dasturlar mashina kodida yozilgan. Dastur tuzuvchi o‘zi xotira yacheykalarini dastur orqali taqsimlagan. Birinchi avlod mashinalariga misol tariqasida quyidagilarni keltirish mumkin: BESM-1, BESM-2, Strela, M-3, Minsk-1, M-20 va boshqalar.



Rasm 2.2. BESM-2 elektron hisoblash mashinasi

1960- yillarning boshlarida elektron lampalar o‘rniga yarim o‘tkazgichlar va ular bazasida yaratilgan tranzistorlar ishlatila boshlandi, bu esa mashinaning massasi, o‘lchovlari va iste’mol qiladigan energiya va issiqlik ajralishini keskin kamaytirish imkonini berdi. Yarim o‘tkazgichli mashinalar EHMning ikkinchi avlodi bo‘ldi va ularning ishlash ishonchliligi va tezligi ancha ortdi.

Bu avlodga mansub mashinalarning o‘ziga xos xususiyatlaridan biri ularning qo‘llanilish sohasi bo‘yicha ixtisoslash mumkinligidir. Bu mashinalarda qo‘yilgan masalalarni yechish uchun dasturlash tillaridan foydalanila boshlandi.

Rasm 2.3. PDP-8 nomli ikkinch avlod EHMi

EHMning ikkinchi avlodi 1960-1970 yillarni o‘z ichiga oladi. Ularga misol qilib qo‘yidagi hisoblash mashinalarni aytish mumkin: Minsk-2, Ryazan’, BESM-6, Mir, Nairi, Minsk-22, Minsk-32 va boshqalar.

Uchinchi avlod mashinalari 1970-1980 yillarda yaratildi.Ishonchlilik, ixchamlik, ishlatishga qulaylik masalalari – EHMlar elementlar bazasini tayyorlashning mutlaqo yangi texnologiyasi yaratilishiga sabab bo‘ldi. Elektron apparatlarning standart sxemalari va bloklari murakkab strukturali yarim o‘tkazgichli monolit kristallar shaklida tayyorlana boshlandi va ular integral

mikrosxemalar nomini oldi. Bu kichik integral sxemalar asosida tayyorlangan EHMlarning tezligi oshib sekundiga bir milliongacha amallar bajaradigan bo‘ldi.Tezkor xotira hajmi ham ancha kengayib, yuz mingtagacha so‘zga yetdi. Uchinchi avloda EHMlari fan va texnika sohasida keng qo‘llana boshlandi. Uchinchi avlod mashinalari xarakterli tomonlaridan biri EHMlar arxitekturasida katta siljish bo‘lganligidir.Bundan tashqari dasturiy ta’minoti rivojlandi, inson bilan EHM o‘rtasida qulay muloqot tashkil etildi. Bu avvalo, tashqi qurilmalarning – alfavit-raqamli terminallar, diametri 30smli magnit disklar va operatsion tizimlarning rivoji bilan amalga oshdi.

Uchinchi avlod mashinalari davrida EHMlarning qo‘llanish sohasida katta siljish bo‘ldi.Avvallari EHMdan faqatgina ilmiy-texnik hisob kitob ishlari bajariladigan bo‘lsa, endiliklada belgili ma’lumotlarni ham qayta ishlash mumkin bo‘ldi. Bu avlod mashinalariga misol qilib, sobiq ittifoqda yaratilgan katta va o‘rtacha EHMlar: Ural-11, Ural-12, Ural-15 va yagona seriyali ESEHM larni keltirish mumkin. Bu mashinalardan eng quvvatlisi hisoblangan EHM ES-1060 sekundiga 1,5 mln. amalni bajarar edi. ESEHMining operativ xotirasi yuzlab kilobayt va megabayt bilan o‘lchanadi.

Rasm 2.4. Uchinchi avlod mashinasi

To‘rtinchi avlod EHMlarini yaratishga 1970 yilning ikkinchi yarmidan kirishilib 1980 yilga yaqin yakunlandi.Bu davrda katta integral sxemlar yaratildi.Ularda “$1sm^2$” ga yuz minglab elektron elementlar joylashtirildi. Bu katta integral sxemalar asosida yaratilgan EHMlarning tezligi va tezkor xotira hajmi birinchi avlod EHMlarinikiga qaraganda yuz ming martaga oshdi va sekundiga 10^9 amal bajaradigan bo‘ldi. Katta integral sxemalarning paydo bo‘lishi sonli axborotlarni qayta ishlab chiqadigan dastur asosida boshqariladigan qurilmalar –

mikroprotsessorlarning yaratilishiga olib keldi.Sanoatda 1970-yillarda mikroprotsessorlar asosida to‘rtinchi avlod mashinalari—mikro EHMlar ishlab chiqarila boshlandi. To‘rtinchi avlod mashinalari tarkibiga sobiq ittifoqda yaratilgan EL’BRUS-2, M-10 EHMlari va hozirgi zamon shaxsiy komp’yuterlari ham mansub. Mikrokomp’yuterlar qurilmalarining boshqarish qurilmasi, bitta katta integral sxemalar tarzida ishlanganligi uchun ularning tashqi qurilmalari uncha katta emasligi, ishlash tezligi va bahosi arzonligi bilan ajralib turadi.

Mikroelektronikaning yutuqlari asosida shaxsiy elektron hisoblash mashinalari (ShEHM) yaratildi. Arzon, kichik hajmdagi avtonom mikroprotsessorli hisoblash tizimi ShEHMlarining ommaviy qo‘llanilishi ko‘plab dasturli vositalar, ya’ni amaliy dasturlar paketi, operatsion tizimlar, translyatorlar va boshqalarni yaratishga olib keldi.

Ayni vaqtda beshinchi avlod EHMlari ustida ish olib borilyapti.Ushbu avlod mashinalari oddiy so‘zni "tushunadigan", rasmlarni "ko‘ra oladigan", tovushlarni "eshita oladigan", sekundiga 1 mlrd.atrofida amal bajara oladigan va katta hajmdagi xotiraga ega bo‘lgan holda ixcham bo‘lishi kerak.

EHMlarning hajmini qisqartirishga va komp’yuter yaratilishiga 1948 yilda yaratilgan tranzistorlar sabab bo‘ldi, chunki elektron lampalar o‘rnini kichik hajmdagi tranzistorlar egallashiga imkon yaratildi.

1965 yilda Digital Eguipmentfirmasi RDR-8 rusumli dastlabki minikomp’yuter yaratdi. Ayni shu davrda minikomp’yuterlar yaratilishiga, yana bir yangilik - integral sxemalar kashf etilishi bo‘ldi.

1959 yilda ***Intel*** firmasining bo‘lg‘usi asoschisi Robert Noys bitta plastinkada tranzistorlarni o‘zaro bog‘lash usulini yaratdi. Bu elektron sxemalar keyinchalik integral sxemalar deb yuritila boshladi.

Shunday qilib, 1968 yilda Vurroughs firmasi dastlabki integral sxemalar asosida ishlovchi komp’yuter yaratdi.

1970 yildan boshlab ***Intel*** firmasi xotiraning integral sxemasini ishlab chiqarib, keng miqiyosda sota boshladi.1973 yilda ***Intel*** firmasi tomonidan 8-baytli ***Intel-8008*** mikroprotsessori, 1974 yilda ***Intel-8080*** versiyasi yaratildi.

1970 yilda shaxsiy komp’yuterlarning yuzaga kelishi katta EHMlarga bo‘lgan talabni susaytirdi.Bu esa o‘z navbatida ***IBM (International Business Machines Corparation)*** firmasi faoliyatiga keskin ta’sir o‘tkazdi. 1979 yilda boshlangan izlanishlar 1981 yilda (16 razryadli Intel 8088 mikroprotsessori asosida) yaratilgan va bozorda o‘z o‘rnini topgan IBM PC komp’yuterida o‘z samarasini berdi. Oradan ikki yil o‘tib, bozorda o‘zining munosib o‘rnini egalladi.1983 yilda IBM PC XT, 1985 yilda IBM PC AT komp’yuterlari ishlab chiqarildi.

Ko‘p o‘tmay boshqa firmalar ham IBM PC komp’yuterini ishlab chiqara boshladi. Ayni vaqtda u nafaqat Amerika va Evropa mamlakatlarida balki Janubiy-Sharqiy Osiyo mamlakatlarida, hususan Tayvan, Janubiy Koreya, Yaponiya, Singapur, Malayziya mamlakatlarida ham g‘arb mamlakatlariga qaraganda arzonroq narxda ishlab chiqarilib jahon bozorida sotila boshladi.

Shunday qilib kompyuter - bu insoniyatning eng ajoyib kashfiyotlaridan biridir. Hozirgi kunda kompyuter hayotimizning barcha sohalariga shiddat bilan kirib bormoqda. Agar boshida shaxsiy kompyuterlardan asosan ma’lumotlarni saqlash va ularni qayta ishlash uchun foydalanilgan bo‘lsa, hozirgi kunda kompyuterlar audio, video ma’lumotlar bilan ishlovchi kino texnologiyalarida keng foydalanilmoqda.

Nazorat savollari:

1. EHM nima?
2. EHMlarning yaratilish tarixi haqida nimalarni bilasiz?
3. EHMlarning nechta avlodi mavjud?
4. Birinchi avlod EHMlari haqida nimalarni bilasiz?
5. Ikkinchi avlod EHMlarini asosini nima tashkil etadi?
6. Integral sxemalar nechanchi avlod EHMlarini asosini tashkil etadi?
7. To‘rtinchi avlod EHMlari haqida nimalarni bilasiz?

Xorij adabiyoti

Fundamentals of

Information Systems

6E

RALPH STAIR • GEORGE REYNOLDS

Manual and Computerized Information Systems

As discussed earlier, an information system can be manual or computerized. For example, some investment analysts manually draw charts and trend lines to assist them in making investment decisions. Tracking data on stock prices (input) over the last few months or years, these analysts develop patterns on graph paper (processing) that help them determine what stock prices are likely to do in the next few days or weeks (output). Some investors have made millions of dollars using manual stock analysis information systems. Of course, today many excellent computerized information systems follow stock indexes and markets and suggest when large blocks of stocks should be purchased or sold (called *program trading*) to take advantage of market discrepancies.

Computer-Based Information Systems

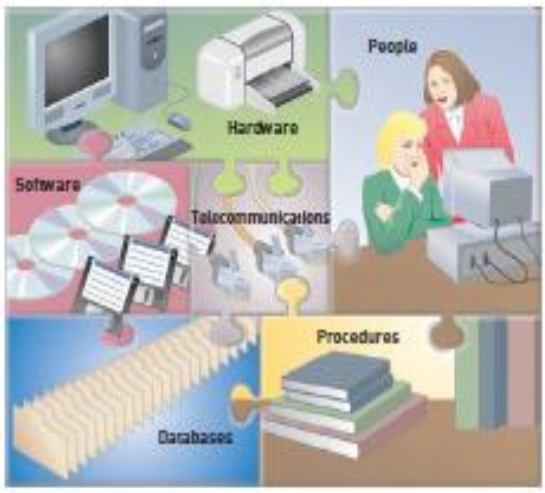
computer-based information system (CBIS)
A single set of hardware, software, databases, telecommunications, people, and procedures that are configured to collect, manipulate, store, and process data into information.

technology infrastructure
All the hardware, software, databases, telecommunications, people, and procedures that are configured to collect, manipulate, store, and process data into information.

A computer-based information system (CBIS) is a single set of hardware, software, databases, telecommunications, people, and procedures that are configured to collect, manipulate, store, and process data into information. Lloyd's Insurance in London used a CBIS to reduce paper transactions and convert to an electronic insurance system. The CBIS allows Lloyd's to insure people and property more efficiently and effectively. Lloyd's often insures the unusual, including actress Betty Grable's legs, Rolling Stone Keith Richards's hands, and a possible appearance of the Loch Ness Monster (Nessie) in Scotland, which would result in a large payment for the person first seeing the monster.

The components of a CBIS are illustrated in Figure 1.4. *Information technology (IT)* refers to hardware, software, databases, and telecommunications. Telecommunications also includes networks and the Internet. A business's technology infrastructure includes all the hardware, software, databases, telecommunications, people, and procedures that are configured to collect, manipulate, store, and process data into information. The technology infrastructure is a set of shared IS resources that form the foundation of each computer-based information system.

Figure 1.4
The Components of a Computer-Based Information System



Hardware

hardware
The physical components of a computer that perform the input, processing, storage, and output activities of the computer.

Hardware consists of the physical components of a computer that perform the input, processing, storage, and output activities of the computer. Input devices include keyboards, mice, and other pointing devices; automatic scanning devices; and equipment that can read magnetic ink characters. Processing devices include computer chips that contain the central processing unit and main memory. Advances in chip design allow faster speeds, less power consumption, and larger storage capacity. Some specialized computer chips will be able to monitor power consumption for companies and homeowners.[14] SanDisk and other

companies make small, portable chips that are used to conveniently store programs, data files, and more.[15] The publisher of this book, for example, used this type of chip storage device to send promotional material for this book to professors and instructors.

Processor speed is also important. Today's more advanced processor chips have the power of 1990s-era supercomputers that occupied a room measuring 10 feet by 40 feet. A large IBM computer used by U.S. Livermore National Laboratories to analyze nuclear explosions is one of the fastest computers in the world (up to 300 teraflops—300 trillion operations per second).[16] The super-fast computer, called Blue Gene, costs about $40 million.[17] It received the *National Medal of Technology and Innovation* award from President Barack Obama. Small, inexpensive computers and handheld devices are also becoming popular. Inexpensive netbooks are small, inexpensive laptop computers that can cost less than $500 and be used primarily to connect to the Internet.[18] In addition, the iPhone by Apple Computer can perform many functions that can be done on a desktop or laptop computer.[19] The One Laptop Per Child computer costs less than $200.[20] The Classmate PC by Intel will cost about $300 and include some educational software. Both computers are intended for regions of the world that can't afford traditional personal computers. The country of Peru, for example, has purchased about 350,000 laptops loaded with about 100 books for children, who also teach their parents how to use the inexpensive computers.[21] According to the founder of One Laptop Per Child, "If that doesn't give you goose bumps, I don't know what will."

The One Laptop Per Child Computer costs less than $200, and is designed for regions of the world that can't afford traditional personal computers.

(Source: Courtesy of AFP/Getty Images.)

The many types of output devices include printers and computer screens. Some touch-sensitive computer screens, for example, can be used to execute functions or complete programs, such as connecting to the Internet or running a new computer game or word processing program.[22] Many special-purpose hardware devices have also been developed. Computerized event data recorders (EDRs) are now being placed into vehicles. Like an airplane's black box, EDRs record vehicle speed, possible engine problems, driver performance, and more. The technology is being used to document and monitor vehicle operation, determine the cause of accidents, and investigate whether truck drivers are taking required breaks. In one case, an EDR was used to help convict a driver of vehicular homicide. In another case, an EDR in a police officer's car showed that the officer may have run a stop light and accelerated to more than 70 miles per hour on a road with a speed limit of 35 miles per hour before an accident that killed two teenagers.[23]

Software

software
The computer programs that govern the operation of the computer.

Software consists of the computer programs that govern the operation of the computer. These programs allow a computer to process payroll, send bills to customers, and provide managers with information to increase profits, reduce costs, and provide better customer service. Fab Lab software, for example, controls tools such as cutters, milling machines, and other devices.[24] One Fab Lab system, which costs about $20,000, has been used to make radio frequency tags to track animals in Norway, engine parts to allow tractors to run on processed castor beans in India, and many other fabrication applications. SalesForce (*www.salesforce.com*) sells software to help companies manage their salesforce and help improve customer satisfaction.[25]

The two types of software are *system software*, such as Microsoft Windows Vista and Windows 7, which controls basic computer operations, including start-up and printing, and *application software*, such as Microsoft Office 2010, which allows you to accomplish specific tasks, including word processing or tabulating numbers.[26] Software is needed for computers of all sizes, from small handheld computers to large supercomputers. The Android operating system by Google and Microsoft's Mobile 6.5, for example, are operating systems for cell phones and small portable devices.[27] Although most software can be installed from CDs, many of today's software packages can be downloaded through the Internet.

IBM's Sequoia will be the fastest supercomputer in the world when it becomes operational in 2012 and can perform calculations at the rate of 20 petaflops—equivalent to an astounding 3 million computations by every human on the planet each second!

(Source: Courtesy of IBM Corporation.)

GREEN COMPUTING

green computing
A program concerned with the efficient and environmentally responsible design, manufacture, operation, and disposal of IS-related products.

Green computing is concerned with the efficient and environmentally responsible design, manufacture, operation, and disposal of IS-related products, including all types of computers, printers, and printer materials, including cartridges and toner. Business organizations recognize that going green is in their best interests in terms of public relations, safety of employees, and the community at large. They also recognize that green computing presents an opportunity to substantially reduce total costs over the life cycle of their IS equipment. Green computing has three goals: reduce the use of hazardous material, enable companies to lower their power-related costs (including potential cap and trade fees), and enable the safe disposal or recycling of some 700,000 tons of computers each year.

Computer manufacturers such as Apple, Dell, and Hewlett-Packard have long competed on the basis of price and performance. As the difference among the manufacturers in these two arenas narrows, support for green computing is emerging as a new business strategy for these companies to distinguish themselves from the competition. Apple claims to have the "greenest lineup of notebooks" and is making progress at removing toxic chemicals. Dell's new mantra is to become "the greenest technology company on Earth." Hewlett-Packard highlights its long tradition of environmentalism and is improving its packaging to reduce use of materials. Hewlett-Packard is also urging computer users around the world to shut down their computers at the end of the day to save energy and reduce carbon emissions.

We now turn to the other critical component of effective computer systems—software. Like hardware, software has made great technological leaps in a relatively short time span.

OVERVIEW OF SOFTWARE

As you learned in Chapter 1, software consists of computer programs that control the workings of computer hardware. Computer programs are sequences of instructions for the computer. Documentation describes the program functions to help the user operate the computer system. The program displays some documentation on screen, while other forms appear in external resources, such as printed manuals. People using commercially available software are usually asked to read and agree to End-User License Agreements (EULAs). After reading the EULA, you normally have to click an "I agree" button before you can use the software, which can be one of two basic types: systems software and application software.

computer programs
Sequences of instructions for the computer.

Application software has the greatest potential to affect processes that add value to a business because it is designed for specific organizational activities and functions.

(Source: © Jim West/Alamy.)

Systems software is the set of programs designed to coordinate the activities and functions of the hardware and various programs throughout the computer system. Each type of systems software is designed for a specific CPU design and class of hardware. Application software consists of programs that help users solve particular computing problems. In most cases, application software resides on the computer's hard disk before it is brought into the computer's main memory and run. Application software can also be stored on CDs, DVDs, and even flash or key chain storage devices that plug into a USB port. An increasing amount of application software is available on the Web. Sometimes referred to as a *rich Internet application* (*RIA*), a Web-delivered software application combines hardware resources of the Web server and the PC to deliver valuable software services through a Web browser interface. Before a person, group, or enterprise decides on the best approach for acquiring application software, they should analyze their goals and needs carefully.

Supporting Individual, Group, and Organizational Goals

Every organization relies on the contributions of individuals, groups, and the entire enterprise to achieve business objectives. To help them achieve these objectives, the organization provides them with specific application software and information systems. One useful way of classifying the many potential uses of information systems is to identify the scope of the problems and opportunities addressed by a particular organization, called the sphere of influence. For most companies, the spheres of influence are personal, workgroup, and enterprise. Table 2.4 shows how various kinds of software support these three spheres.

Information systems that operate within the *personal sphere of influence* serve the needs of individual users. These information systems enable users to improve their personal effectiveness, increasing the amount of work that can be done and its quality. Such software is often referred to as *personal productivity software*. For example, MindManager software from Mindjet provides tools to help people diagram complex ideas and projects using an intuitive graphic interface.[27]