Chapter5

DatabaseManagementSystem

Introduction:

Adatabasemanagementsystem(DBMS)isasoftwarepackagedesignedtodefine,manipulate, retrieveandmanagedatainadatabase.

SomeotherDBMSexamplesinclude:

MySQL
SQLServer
Oracle
dBASE
FoxPro

DataHierarchy:

Thecomponentsofthedatahierarchyarelistedbelow.

Adatafieldholdsasinglefactorattributeofanentity.Consideradatefield,e.g."19September 2004".Thiscanbetreatedasasingledatefield(e.g.birthdate),orthreefields,namely,dayofmonth,monthandyear.

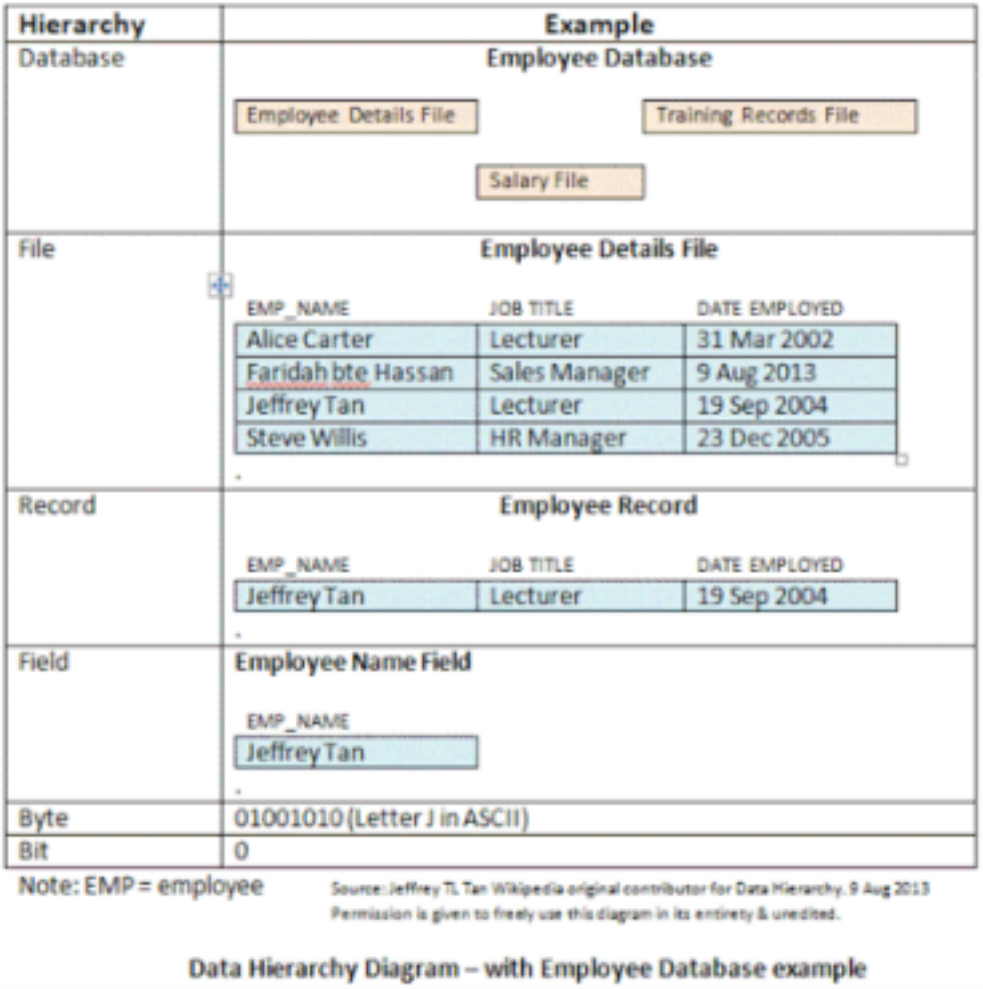
Arecordisacollectionofrelatedfields.AnEmployeerecordmaycontainanamefield(s), addressfields,birthdatefieldandsoon.

Afileisacollectionofrelatedrecords.Ifthereare100employees,theneachemployeewould havearecord(e.g.calledEmployeePersonalDetailsrecord)andthecollectionof100such recordswouldconstituteafile(inthiscase,calledEmployeePersonalDetailsfile).

Filesareintegratedintoadatabase.ThisisdoneusingaDatabaseManagementSystem.Ifthere areotherfacetsofemployeedatathatwewishtocapture,thenotherfilessuchasEmployeeTrainingHistoryfileandEmployeeWorkHistoryfilecouldbecreatedaswell.

Illustrationofthedatahierarchy

Anillustrationoftheabovedescriptionisshowninthisdiagrambelow.



Data Hierarchy Diagram – with Employee Database example

Thefollowingtermsareforbetterclarity.
Withreferencetotheexampleintheabovediagram.

DatafieldlabelEmployeeNameorEMP_NAME

DatafieldvalueJeffreyTan

Theabovedescriptionisaviewofdataasunderstoodbyausere.g.apersonworkinginHuman ResourceDepartment.

Theabovestructurecanbeseeninthehierarchicalmodel,whichisonewaytoorganizedatain adatabase.Intermsofdatastorage,datafieldsaremadeofbytesandtheseinturnaremade upofbits.

TraditionalFileApproach/traditionalfilesystem:

Fileprocessingsystemswasanearlyattempttocomputerizethemanualfilingsystemthatwe are allfamiliarwith.Afilesystemisamethodforstoringandorganizingcomputerfilesandthedata theycontaintomakeiteasytofindandaccessthem.Filesystemsmayuseastoragedevicesuch asaharddiskorCD-ROMandinvolvemaintainingthephysicallocationofthefiles.

LimitationsoftheFileProcessingSystemIFile-BasedApproach
TherearefollowingproblemsassociatedwiththeFileBasedApproach:

1.SeparatedandIsolatedData:Tomakeadecision,ausermightneeddatafromtwoseparate files.First,thefileswereevaluatedbyanalystsandprogrammerstodeterminethespecificdat a requiredfromeachfileandtherelationshipsbetweenthedataandthenapplicationscouldbe writteninaprogramminglanguagetoprocessandextracttheneededdata.Imaginethework involvedifdatafromseveralfileswasneeded.

2.Duplicationofdata:Oftenthesameinformationisstoredinmorethanonefile.Uncontrolled duplicationofdataisnotrequiredforseveralreasons,suchas:

•Duplicationiswasteful.Itcoststimeandmoneytoenterthedatamorethanonce

•Ittakesupadditionalstoragespace,againwithassociatedcosts.

•Duplicationcanleadtolossofdataintegrity;inotherwordsthedataisnolongerconsistent.For example,considertheduplicationofdatabetweenthePayrollandPersonneldepartments.Ifa memberofstaffmovestonewhouseandthechangeofaddressiscommunicatedonlyto PersonnelandnottoPayroll,theperson'spayslipwillbesenttothewrongaddress.Amore seriousproblemoccursifanemployeeispromotedwithanassociatedincreaseinsalary.Agai n,
thechangeisnotifiedtoPersonnelbutthechangedoesnotfilterthroughtoPayroll.Now,the employeeisreceivingthewrongsalary.Whenthiserrorisdetected,itwilltaketimeandeffortto resolve.Boththeseexamples,illustrateinconsistenciesthatmayresultfromtheduplicationof data.AsthereisnoautomaticwayforPersonneltoupdatethedatainthePayrollfiles,itis difficulttoforeseesuchinconsistenciesarising.EvenifPayrollisnotifiedofthechanges,itis possiblethatthedatawillbeenteredincorrectly.

3.DataDependence:Infileprocessingsystems,filesandrecordsweredescribedbyspecific physicalformatsthatwerecodedintotheapplicationprogrambyprogrammers.Iftheformatof acertainrecordwaschanged,thecodeineachfilecontainingthatformatmustbeupdated. Furthermore,instructionsfordatastorageandaccesswerewrittenintotheapplication'scode. Therefore,.changesinstoragestructureoraccessmethodscouldgreatlyaffecttheprocessin gor resultsofanapplication.

Inotherwords,infilebasedapproachapplicationprogramsaredatadependent.Itmeansthat, withthechangeinthephysicalrepresentation(howthedataisphysicallyrepresentedindisk)or accesstechnique(howitisphysicallyaccessed)ofdata,applicationprogramsarealsoaffecte d
andneedsmodification.Inotherwordsapplicationprogramsaredependentonthehowthedat a isphysicallystoredandaccessed.

Ifforexample,ifthephysicalformatofthemaster/transactionfileischanged,bymakinghe modificationinthedelimiterofthefieldorrecord,itnecessitatesthattheapplicationprograms whichdependonitmustbemodified.

Letusconsiderastudentfile,whereinformationofstudentsisstoredintextfileandeachfieldis separatedbyblankspaceasshownbelow:

IRahat35Thapar

Now,ifthedelimiterofthefieldchangesfromblankspacetosemicolonasshownbelow

: 1;Rahat;35;Thapar

Then,theapplicationprogramsusingthisfilemustbemodified,becausenowitwilltokenthefield onsemicolon;butearlieritwasblankspace.

4.Difficultyinrepresentingdatafromtheuser'sview:Tocreateusefulapplicationsfortheuser, oftendatafromvariousfilesmustbecombined.Infileprocessingitwasdifficulttodetermine relationshipsbetweenisolateddatainordertomeetuserrequirements.

5.DataInflexibility:Program-datainterdependencyanddataisolation,limitedtheflexibilityoffile processingsystemsinprovidinguserswithad-hocinformationrequests

6.Incompatiblefileformats:Asthestructureoffilesisembeddedintheapplicationprograms,the structuresaredependentontheapplicationprogramminglanguage.Forexample,thestructure ofafilegeneratedbyaCOBOLprogrammaybedifferentfromthestructureofafilegenerated bya'C'program.Thedirectincompatibilityofsuchfilesmakesthemdifficulttoprocessjointly.

7.DataSecurity.Thesecurityofdataislowinfilebasedsystembecause,thedataismaintained intheflatfile(s)iseasilyaccessible.ForExample:ConsidertheBankingSystem.TheCustomer Transactionfilehasdetailsaboutthetotalavailablebalanceofallcustomers.ACustomerwants informationabouthisaccountbalance.Inafilesystemitisdifficulttogivetheaccesstoonlyhisdatainthe·file.Thusenforcingsecurityconstraintsfortheentirefileorforcertaindata itemsaredifficult.

8.TransactionalProblems.TheFilebased system approachdoesnotsatisfytransaction propertieslikeAtomicity,Consistency,IsolationandDurabilitypropertiescommonlyknownas ACIDproperties.

Forexample:Suppose,inabankingsystem,atransactionthattransfersRs.1000fromaccount A toaccountBwithinitialvalues'ofAandBbeingRs.5000andRs.10000respectively.Ifasystem crashoccurredafterthewithdrawalofRs.1000fromaccountA,butbeforedepositingofamount inaccountB,itwillresultaninconsistentstateofthesystem.Itmeansthatthetransactionsshould notexecutepartiallybutwholly.ThisconceptisknownasAtomicityofatransaction(either0%or 100%oftransaction).Itisdifficulttoachievethispropertyinafilebasedsystem.

9.Concurrencyproblems.Whenmultipleusersaccessthesamepieceofdataatsameinterval of timethenitiscalledasconcurrencyofthesystem.Whentwoormoreusersreadthedata simultaneouslythereisll(problem,butwhentheyliketoupdateafilesimultaneously,itmayresult inaproblem.

Forexample:=

LetusconsiderascenariowhereintransactionT1ausertransfersanamout1t1000from

AccountAtoB(initialvalueofAis5000andBis8000).Inmeanwhile,anothertransactionT2, triestodisplaythesumofaccountAandBisalsoexecuted.Ifboththetransactionrunsin parallelitmayresultsinconsistencyasshownbelow:

TI	T2	Status
withdraw 1000 from accunt A		A is updated to 4000.
	Display sum of account A and B.	It results 4000-8000=12,000/ It show a loss of Rs 1000.
Deposir 1000 in accunt B		Be is update to 9000.

Theaboveschedule resultsinconsistencyofdatabaseanditshowsRs.12,000assumofaccounts AandBinsteadofRs.13,000.Theproblem occursbecausesecondconcurrentlyrunning transactionT2,readsAandBatintermediatepointandcomputesitssum,whichresults inconsistentvalue.

10.Poordatamodelingofrealworld.Thefilebasedsystemisnotabletorepresentthecomplex dataandinterfilerelationships,whichresultspoordatamodelingproperties.

DataDuplication

- *Dataduplicationoccurswhenanexactcopyofapieceofdataiscreated*
- *Forexample,copyandpastinganitemcalled"MyPicture.jpg"*
- *o Thenewpasteditemcontainstheexactsamedataastheoriginalpicture o OndifferentOperatingSystems,thenamingconventionforcopieswillchange(e.g. "MyPicture2.jpg"or"MyPicturecopy.jpg")*
- *Dataduplicationprovidesbenefitssuchasprovidinguswiththeabilitytobackupcopieso f filesandcreatemultipleverionsofafile(whichmayberequiredforprogressreportingor otherinformation)*
- *Theduplicationofdataisoftenintentionalandusedprimarilyforcreatingbackups*
- *Dataduplicationonadatabasemayresultindataredundancy,andthusanineefficientan d inconsistantdatabase*

DataInconsistency

Datainconsistencyisaconditionthatoccursbetweenfileswhensimilardataiskeptindifferent formatsintwodifferentfiles,orwhenmatchingofdatamustbedonebetweenfiles.Asaresultof thedatainconsistency,thesefilesduplicatesomedatasuchasaddressesandnames, compromisingdataintegrity.

Theduplicateddata,alsoknownastheredundantdata,createsunreliableinformationbecau se thechancesofhavingavaluechangedinonefilearehigh,butontheotherfilethevalue remainsthesame.Thisconditionofinconsistencyisoftenexperiencedwhenusingthetraditi onal fileprocessing,anditisveryexpensiveanddifficulttorectifysuchinconsistencies.

LackOfDataIntegration

Dataintegrityistheoverallcompleteness,accuracyandconsistencyofdata.Thiscanbe indicatedbytheabsenceofalterationbetweentwoinstancesorbetweentwoupdatesofadat a record,meaningdataisintactandunchanged.Dataintegrityisusuallyimposedduringthe databasedesignphasethroughtheuseofstandardproceduresandrules.Dataintegritycan be maintainedthroughtheuseofvariouserror-checkingmethodsandvalidationprocedures.

Theconceptofdataintegrityensuresthatalldatainadatabasecanbetracedandconnected tootherdata.Thisensuresthateverythingisrecoverableandsearchable.Havingasingle,we ll definedandwell-controlleddataintegritysystemincreasesstability,performance,reusabilit yand maintainability.Ifoneofthesefeaturescannotbeimplementedinthedatabase,itmustbe implementedthroughthesoftware.

DataDependence
Datadependencymeansthatone/moreattributeuniquelyidentifiesotherattributesofarelati on.
inmoresimpletermswecansaythatsomedatavaluesaredependentonotherdatavaluesin ordertogetrecognized.

example

rollno name

Inthisexamplerollno.willbeuniqueforeachstudentbuttwostudentscanhavesamename. SupposewewanttoknowaboutthestudentwhosenameisAmitbutthereareтwostudentswi th nameAmit,sointhiscasenamedoesn't uniquelyidentifiesthestudent(wehavehaveconfus ion aboutwhichstudent'sinformationwewant).Butifwetakerollno.(say101)thenwewillget informationofonestudentwhosenameisAmitandrollno.is101,hencenoconfusion.Theref ore nameisdependentonrollno.

ProgramDependence

Anapplicationprogramthatdealswithdatastoredexternallytoit(suchasinafileoradatabase) includesinitssourcecodesomestructuraldefinitionofthatdata.Theextenttowhichthat programisexposedtochangesmadetothatexternalsourceiscalleddatadependence.A programisexposed,inthesensemeanthere,ifsomechangetotheexternalsourceinvalidates theprogramandthusnecessitateschangestoitssourcecode("unproductivemaintenance"). By "changetotheexternalsource"wenormallymeanstructuralchangesofanykind—weassume applicationprogramsareimmunetomerechangesinthedatacontentoftheexternalsource, suchasadditionanddeletionofrecordsandupdatesmadetoexistingrecords.

ObjectiveOfDatabase,AdvantageOfdatabaseSystem

Thedatabasemanagementsystem haspromisingpotentialadvantages,whichareexplained below:

1. *ControllingRedundancy:Infilesystem,eachapplicationhasitsownprivatefiles,which cannotbesharedbetweenmultipleapplications.1:hiscanoftenleadtoconsiderable redundancyinthestoreddata,whichresultsinwastageofstoragespace.Byhaving centralizeddatabasemostofthiscanbeavoided.Itisnotpossiblethatallredundancy shouldbeeliminated.Sometimestherearesoundbusinessandtechnicalreasons for·maintainingmultiplecopiesofthesamedata.Inadatabasesystem,howeverthis redundancycanbecontrolled.*

2. *Integritycanbeenforced:Integrityofdatameansthatdataindatabaseisalwaysaccurate , suchthatincorrectinformationcannotbestoredindatabase.Inordertomaintainthe integrityofdata,someintegrityconstraintsareenforcedonthedatabase.ADBMSshould providecapabilitiesfordefiningandenforcingtheconstraints.*

3. *Inconsistencycanbeavoided:Whenthesamedataisduplicatedandchangesaremadeat onesite,whichisnotpropagatedtotheothersite,itgivesrisetoinconsistencyandthetwoentrie s regardingthesamedatawillnotagree.Atsuchtimesthedataissaidtobeinconsistent.So,ifthe redundancyisremovedchancesofhavinginconsistentdataisalsoremoved.*

5. *Standardscanbeenforced:SinceDBMSisacentralsystem,sostandardcanbeenforced easilymaybeatCompanylevel,Departmentlevel,NationallevelorInternationallevel.The standardizeddataisveryhelpfulduringmigrationorinterchangingofdata.Thefilesystemisan independentsystemsostandardcannotbeeasilyenforcedonmultipleindependentapplicati ons.*

6. *Restrictingunauthorizedaccess:Whenmultipleusersshareadatabase,itislikelythatsome userswillnotbeauthorizedtoaccessallinformationinthedatabase.Forexample,account officedataisoftenconsideredconfidential,andhenceonlyauthorizedpersonsareallowedto accesssuchdata.Inaddition,someusersmaybepermittedonlytoretrievedata,whereasothe r areallowedbothtoretrieveandtoupdate.Hence,thetypeofaccessoperationretrievalor updatemustalsobecontrolled.*

7. *SolvingEnterpriseRequirementthanIndividualRequirement:Sincemanytypesofuserswi th varyingleveloftechnicalknowledgeuseadatabase,aDBMSshouldprovideavarietyofuser interface.Theoverallrequirementsoftheenterprisearemoreimportantthantheindividualuse r requirements.So,theDBAcanstructurethedatabasesystemtoprovideanoverallservicethat is "bestfortheenterprise".8.ProvidingBackupandRecovery:ADBMSmustprovidefacilitiesfor recoveringfromhardwareorsoftwarefailures.Thebackupandrecoverysubsystemofthe DB MSis responsibleforrecovery.Forexample,ifthecomputersystemfailsinthemiddleofacomplex updateprogram,therecoverysubsystemisresponsibleformakingsurethatthe.databaseis restoredtothestateitwasinbeforetheprogramstartedexecuting.*

9. *Costofdevelopingandmaintainingsystem islower:Itismucheasiertorespondto*

unanticipatedrequestswhendataiscentralizedinadatabasethanwhenitisstoredina conventionalfilesystem.Althoughtheinitialcostofsettingupofadatabasecanbelarge,butth e costofdevelopingandmaintainingapplicationprogramstobefarlowerthanforsimilarservice usingconventionalsystems.Theproductivityofprogrammerscanbehigherinusingnon procedurallanguagesthathavebeendevelopedwithDBMSthanusingprocedurallanguages .

10.DataModelcanbedeveloped:Thecentralizedsystemisabletorepresentthecomplexdat a andinterfilerelationships,whichresultsbetterdatamodelingproperties.Thedatamadding propertiesofrelationalmodelisbasedonEntityandtheirRelationship,whichisdiscussedin detailinchapter4ofthebook.

11.ConcurrencyControl:DBMSsystemsprovidemechanismstoprovideconcurrentaccess of datatomultipleusers.

DisadvantagesofDBMS

Thedisadvantagesofthedatabaseapproacharesummarizedasfollows:

1.Complexity:Theprovisionofthefunctionalitythatisexpectedofagood DBMSmakestheDB MS an extremely complex piece ofsoftware.Database designers,developers,database administratorsandend-usersmustunderstandthisfunctionalitytotakefulladvantageofit. Failuretounderstandthesystem canleadtobaddesigndecisions,whichcanhaveserious consequencesforanorganization.

2.Size:Thecomplexityandbreadthoffunctionality makestheDBMSanextremelylargepiece of software,occupyingmanymegabytesofdiskspaceandrequiringsubstantialamountsof memorytorunefficiently.

3.Performance:Typically,aFileBasedsystem iswrittenforaspecificapplication,suchas invoicing.Asresult,performanceisgenerallyverygood.However,theDBMSiswrittentobem ore general,tocaterformanyapplicationsratherthanjustone.Theeffectisthatsomeapplications maynotrunasfastastheyusedto.

4.Higherimpactofafailure:Thecentralizationofresourcesincreasesthevulnerabilityofthe system.Sinceallusersandapplicationsrelyonthe~vailabi1ityoftheDBMS,thefailureofany componentcanbringoperationstoahalt.

5.CostofDBMS:ThecostofDBMSvariessignificantly,dependingontheenvironmentand functionalityprovided.Thereisalsotherecurrentannualmaintenancecost.

6.AdditionalHardwarecosts:ThediskstoragerequirementsfortheDBMSandthedatabase may necessitatethepurchaseofadditionalstoragespace.Furthermore,toachievetherequired performanceitmaybenecessarytopurchasealargermachine,perhapsevenamachine dedicatedtorunningtheDBMS.Theprocurementofadditionalhardwareresultsinfurther expenditure.

7.CostofConversion:Insomesituations,thecostofDBMSandextrahardwaremaybe insignificantcomparedwiththecostofconvertingexistingapplicationstorunonthenewDBM S andhardware.Thiscostalsoincludesthecostoftrainingstafftousethesenewsystemsand possiblytheemploymentofspecialiststafftohelpwithconversionandrunningofthesystem.T

his
costisoneofthemainreasonswhysomeorganizationsfeeltiedtotheircurrentsystemsand
cannotswitchtomoderndatabasetechnology.

TypesofDatabaseStructure

Thereareseveraltypesofdatabasemanagementsystems.Hereisalistofsevencom
mon databasemanagementsystems:

1. *Hierarchicaldatabases*
2. *Networkdatabases*
3. *Relationaldatabases*
4. *Object-orienteddatabases*
5. *Graphdatabases*
6. *ERmodeldatabases*
7. *Documentdatabases*
8. *NoSQLdatabases*

HierarchicalDatabases

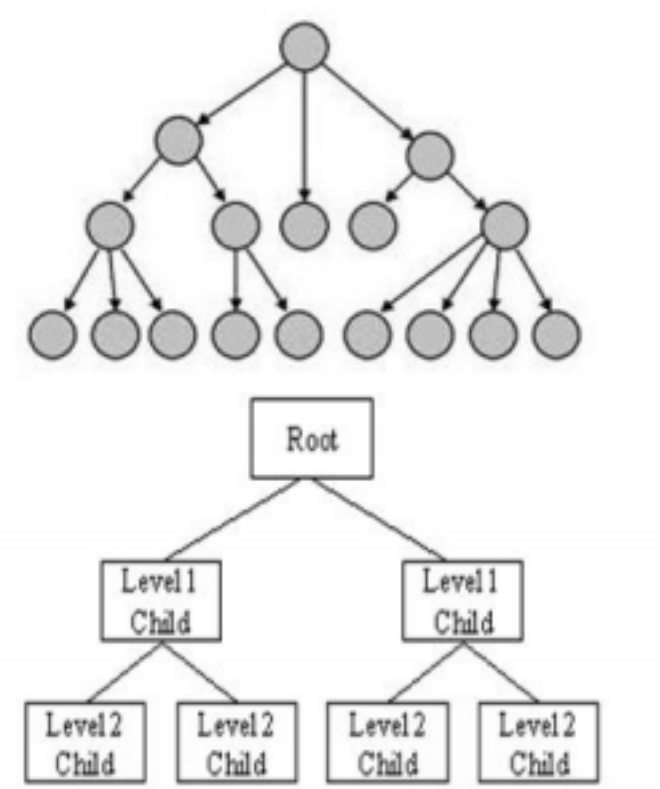
Inahierarchicaldatabasemanagementsystems(hierarchicalDBMSs)model,dataisstore
dina
parent-childrenrelationshipnodes.Inahierarchicaldatabase,besidesactualdata,records
also containinformationabouttheirgroupsofparent/childrelationships.

Inahierarchicaldatabasemodel,dataisorganizedintoatreelikestructure.Thedataisstore
d
informofcollectionoffieldswhereeachfieldcontainsonlyonevalue.Therecordsarelinkedt
o
eachothervialinksintoaparent-childrenrelationship.Inahierarchicaldatabasemodel,ea
ch childrecordhasonlyoneparent.Aparentcanhavemultiplechildren.

Toretrieveafield'sdata,weneedtotraversedthrougheachtreeuntiltherecordisfound.

Thehierarchicaldatabasesystemstructurewasdevelopedby IBMinearly1960s.While
hierarchicalstructureissimple,itisinflexibleduetotheparent-childone-to-manyrelationsh
ip.
Hierarchicaldatabasesarewidelyusedtobuildhighperformanceandavailabilityapplicatio
ns usuallyinbankingandtelecommunicationsindustries.

TheIBMInformationManagementSystem(IMS)andWindowsRegistryaretwopopularexa
mples ofhierarchicaldatabases.



Advantage

Hierarchicaldatabasecanbeaccessedandupdatedrapidlybecauseinthismodelstructure is likeasatreeandtherelationshipsbetweenrecordsaredefinedinadvance.Thisfeatureisatwo edged.

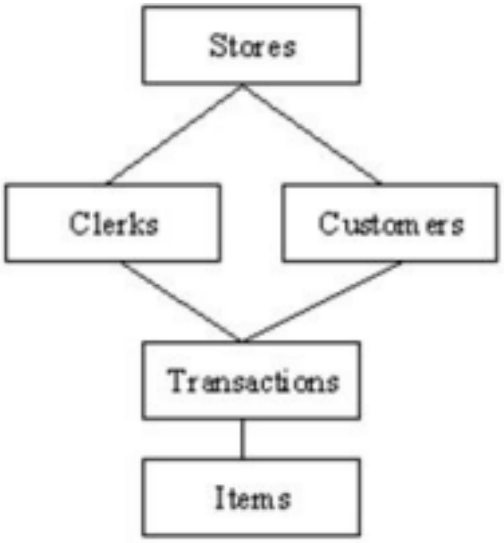
Disadvantage

Thistypeofdatabasestructureisthateachchildinthetreemayhaveonlyoneparent,and relationshipsorlinkagesbetweenchildrenarenotpermitted,eveniftheymakesensefroma logicalstandpoint.Hierarchicaldatabasesaresointheirdesign.itcanaddinganewfieldor recordrequiresthattheentiredatabaseberedefined.

NetworkDatabases

Networkdatabasemanagementsystems(NetworkDBMSs)useanetworkstructuretocreate relationshipbetweenentities.Networkdatabasesaremainlyusedonalargedigitalcomputers. Networkdatabasesarehierarchicaldatabasesbutunlikehierarchicaldatabaseswhereone node canhaveoneparentonly,anetworknodecanhaverelationshipwithmultipleentities.Anetwork databaselooksmorelikeacobweborinterconnectednetworkofrecords.

Innetworkdatabases,childrenarecalledmembersandparentsarecalledoccupier.T he differencebetweeneachchildormembercanhavemorethanoneparent.



Theapprovalofthenetworkdatamodelissimilartoahierarchicaldatamodel.Datainanetwork databaseisorganizedinmany-to-manyrelationships.

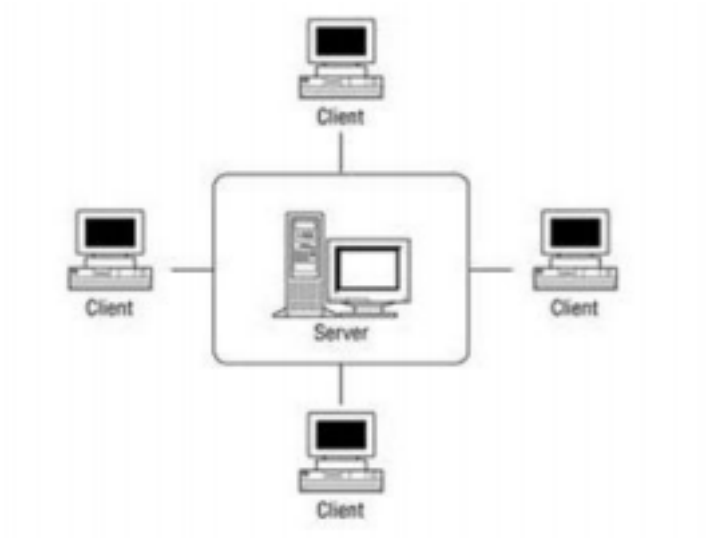
Thenetworkdatabasestructurewasinvented byCharlesBachman.Someofthepopularnet work databasesareIntegratedDataStore(IDS),IDMS(IntegratedDatabaseManagementSyste m), RaimaDatabaseManager,TurboIMAGE,andUnivacDMS-1100.

RelationalDatabases

Inrelationaldatabasemanagementsystems(RDBMS),therelationshipbetweendataisrelat ional anddataisstoredintabularformofcolumnsandrows.Eachcolumnifatablerepresentsan attributeandeachrowinatablerepresentsarecord.Eachfieldinatablerepresentsadata value.

StructuredQueryLanguage(SQL)isathelanguageusedtoqueryaRDBMSincludinginser ting, updating,deleting,andsearchingrecords.

Relationaldatabasesworkoneachtablehasakeyfieldthatuniquelyindicateseachrow,an d thatthesekeyfieldscanbeusedtoconnectonetableofdatatoanother.



Relationaldatabasesarethemostpopularandwidelyuseddatabases.Someofthepopul ar DDBMSareOracle,SQLServer,MySQL,SQLite,andIBMDB2.

Therelationaldatabasehastwomajorreasons

1. *Relationaldatabasescanbeusedwithlittleornotraining.*
2. *Databaseentriescanbemodifiedwithoutspecifytheentirebody.*

PropertiesofRelationalTables

Intherelationaldatabasewehavetofollowsomepropertieswhicharegivenbelow.

- *It'sValuesareAtomic*
- *InEachRowisalone.*
- *ColumnValuesareoftheSamething.*
- *Columnsisundistinguished.*
- *SequenceofRowsisInsignificant.*
- *EachColumnhasacommonName.*

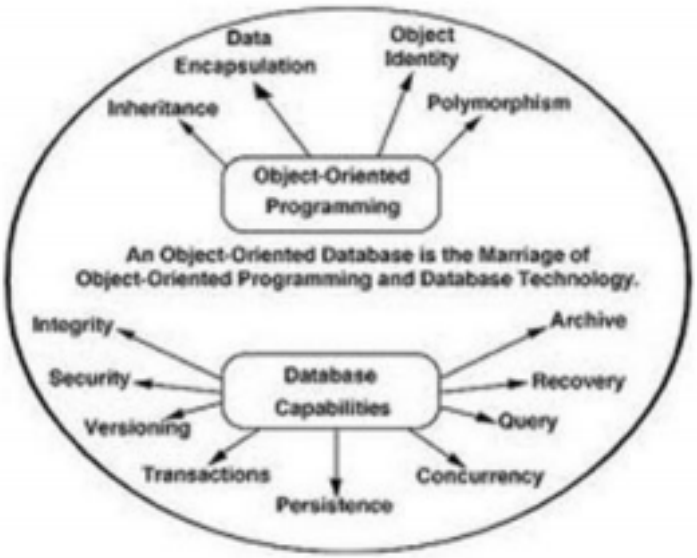
RDBMsarethemostpopulardatabasesintheworld.

Object-OrientedModel

Ittakesmorethanstorageofprogramminglanguageobjects.ObjectDBMS'sincreasethe semanticsoftheC++andJava.Itprovidesfull-featureddatabaseprogrammingcapability,w hile containingnativelanguagecompatibility.Itaddsthedatabasefunctionalitytoobject programminglanguages.Thisapproachistheanalogicaloftheapplicationanddatabase developmentintoaconstantdatamodelandlanguageenvironment.Applicationsrequireles s code,usemorenaturaldatamodeling,andcodebasesareeasiertomaintain.Object developerscanwritecompletedatabaseapplicationswithadecentamountofadditionaleffo rt.

Theobject-orienteddatabasederivationistheintegrityofobject-orientedprogramming languagesystemsandconsistentsystems.Thepoweroftheobject-orienteddatabasescom

es
fromthecyclicaltreatmentofbothconsistentdata,asfoundindatabases,andtransientdata,a
s foundinexecutingprograms.



Object-orienteddatabasesusesmall,recyclableseparatedofsoftwarecalledobjects.
The
objectsthemselvesarestoredintheobject-orienteddatabase.Eachobjectcontainsoft
wo elements:

1. *Pieceofdata(e.g.,sound,video,text,orgraphics).*
2. *Instructions,orsoftwareprogramscalledmethods,forwhattodowiththedata.*

Object-orienteddatabasemanagementsystems(OODBMs)werecreatedinearly1980s.So
me
OODBMsweredesignedtoworkwithOOPlanguagessuchasDelphi,Ruby,C++,Java,andPy
thon.
SomepopularOODBMsareTORNADO,Gemstone,ObjectStore,GBase,VBase,InterSyste
ms Cache,VersantObjectDatabase,ODABA,ZODB,Poet.JADE,andInformix.

DisadvantageofObject-orienteddatabases

1. *Object-orienteddatabaseshavethesedisadvantages.*
2. *Object-orienteddatabasearemoreexpensivetodevelop.*
3. *IntheMostorganizationsareunwillingtoabandonandconvertfromthosedatabases*

. BenefitsofObject-orienteddatabases

Thebenefitstoobject-orienteddatabasesarecompelling.Theabilitytomixandmatchreusa
ble objectsprovidesincrediblemultimediacapability.