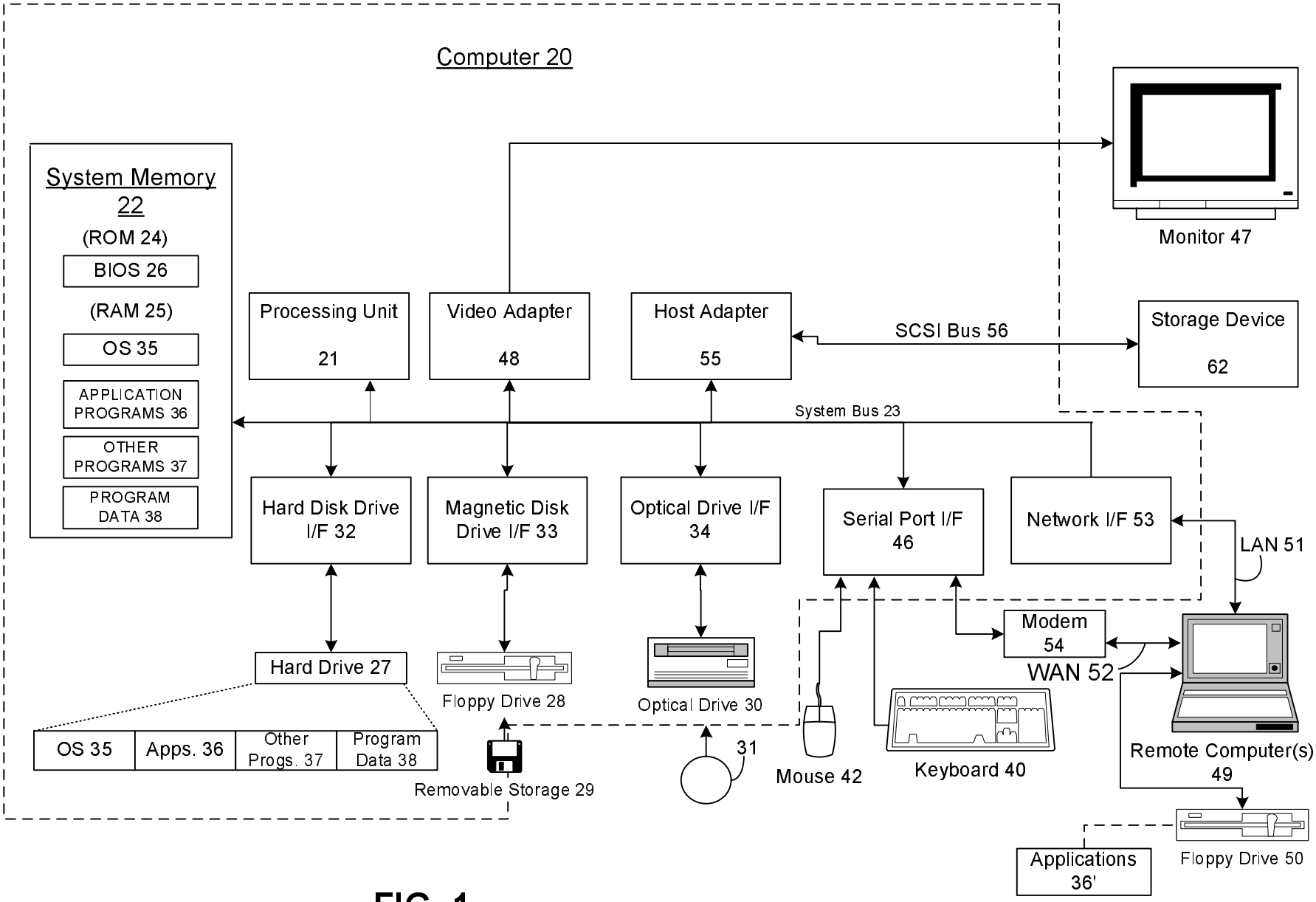

Computer 20
System Memory 22
(ROM 24)
BIOS 26
(RAM 25)
OS 35
APPLICATION PROGRAMS 36
OTHER PROGRAMS 37
PROGRAM DATA 38
Monitor 47
Processing Unit 21
Video Adapter 48
Host Adapter 55
SCSI Bus 56
Storage Device 62
System Bus 23
Hard Disk Drive I/F 32
Magnetic Disk Drive I/F 33
Optical Drive I/F 34
Serial Port I/F 46
Network I/F 53
LAN 51
Modem 54
WAN 52
Hard Drive 27
Floppy Drive 28
Optical Drive 30
OS 35
Apps. 36
Other Progs. 37
Program Data 38
Removable Storage 29
31
Mouse 42
Keyboard 40
Remote Computer(s) 49
Floppy Drive 50
Applications 36'

FIG. 1

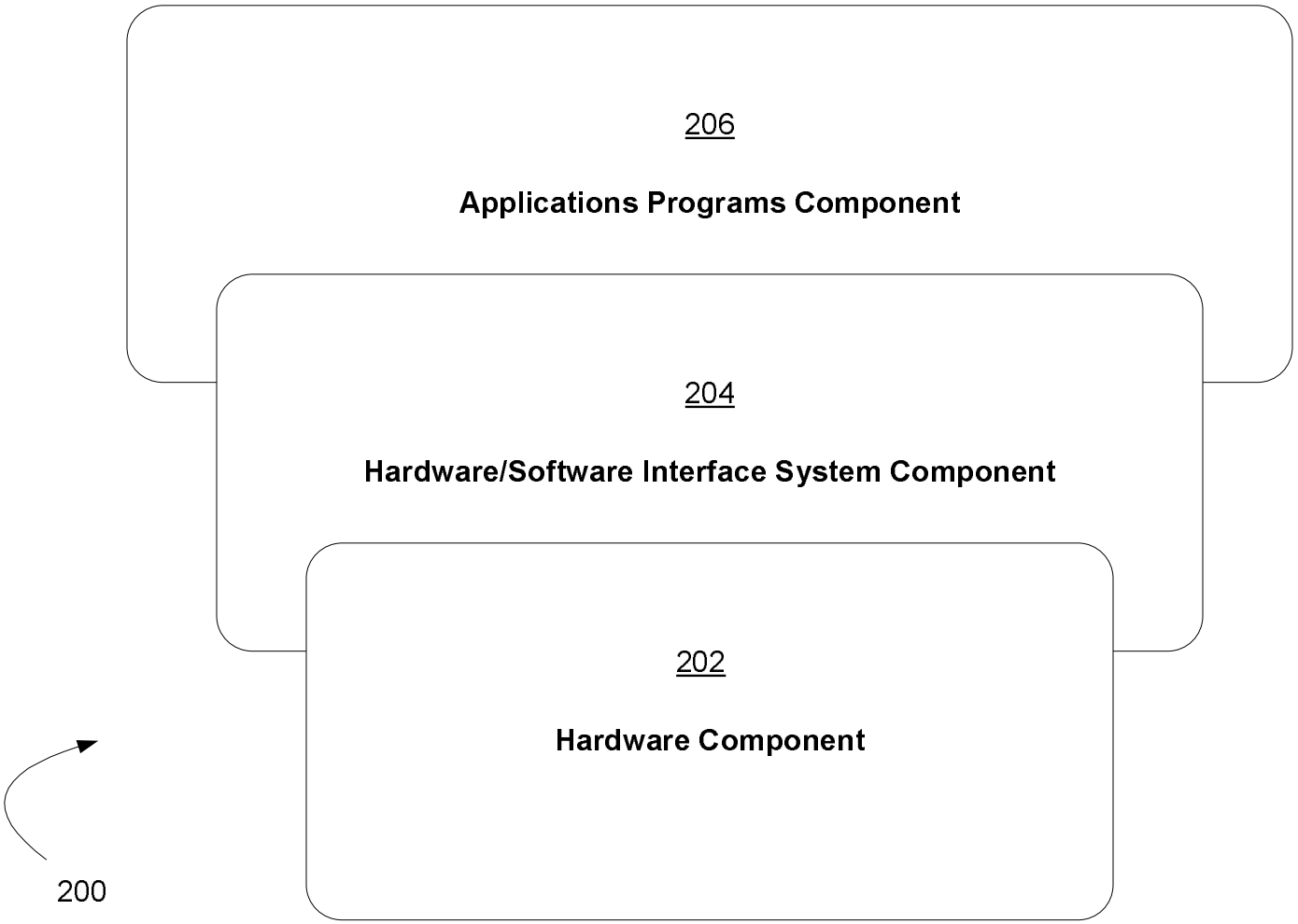

206
Applications Programs Component
204
Hardware/Software Interface System Component
202
Hardware Component
200

FIG. 2

FIG. 2A

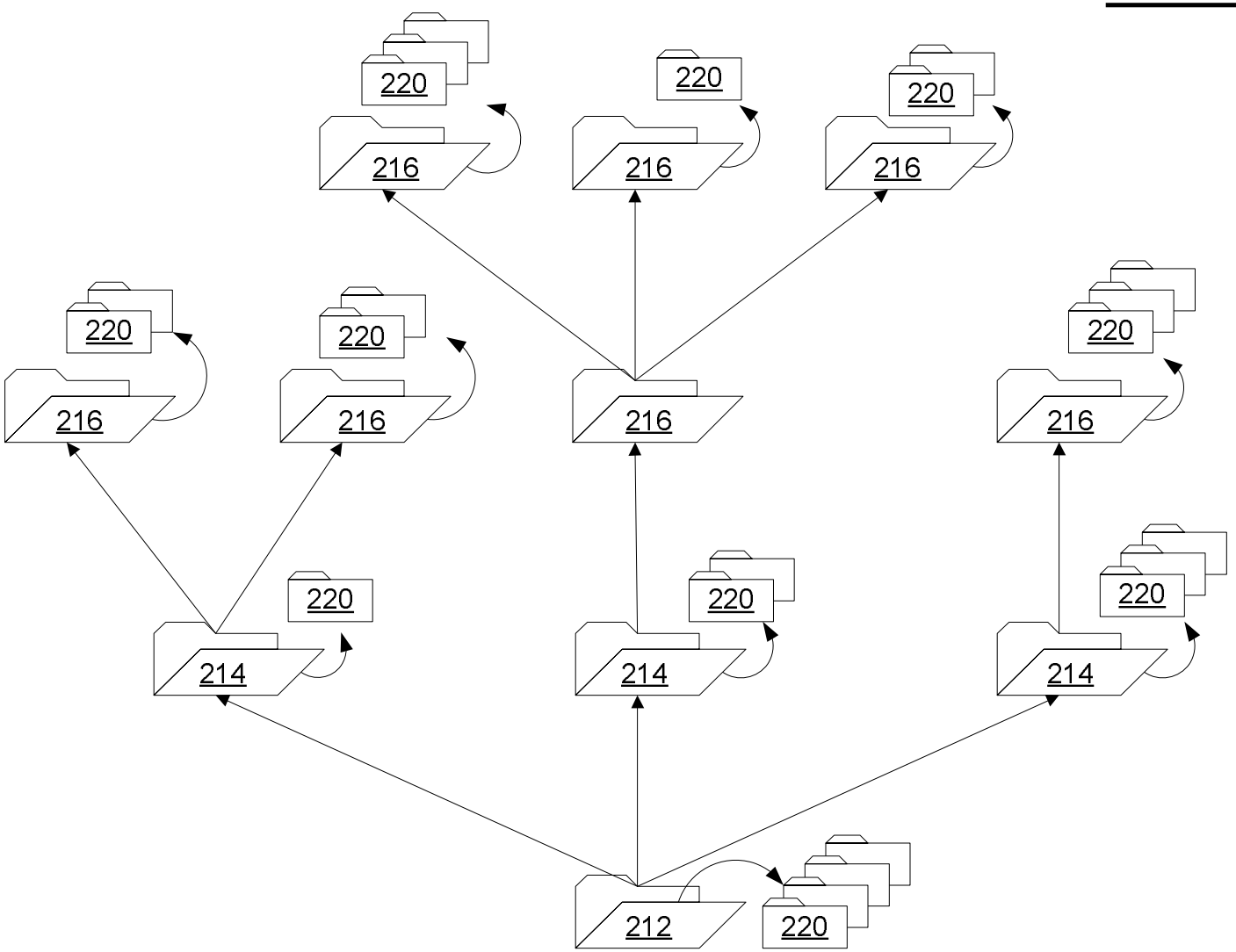

220
216
220
216
220
216
220
216
220
216
220
216
220
216
220
214
220
214
220
214
212
220

Fig. 3

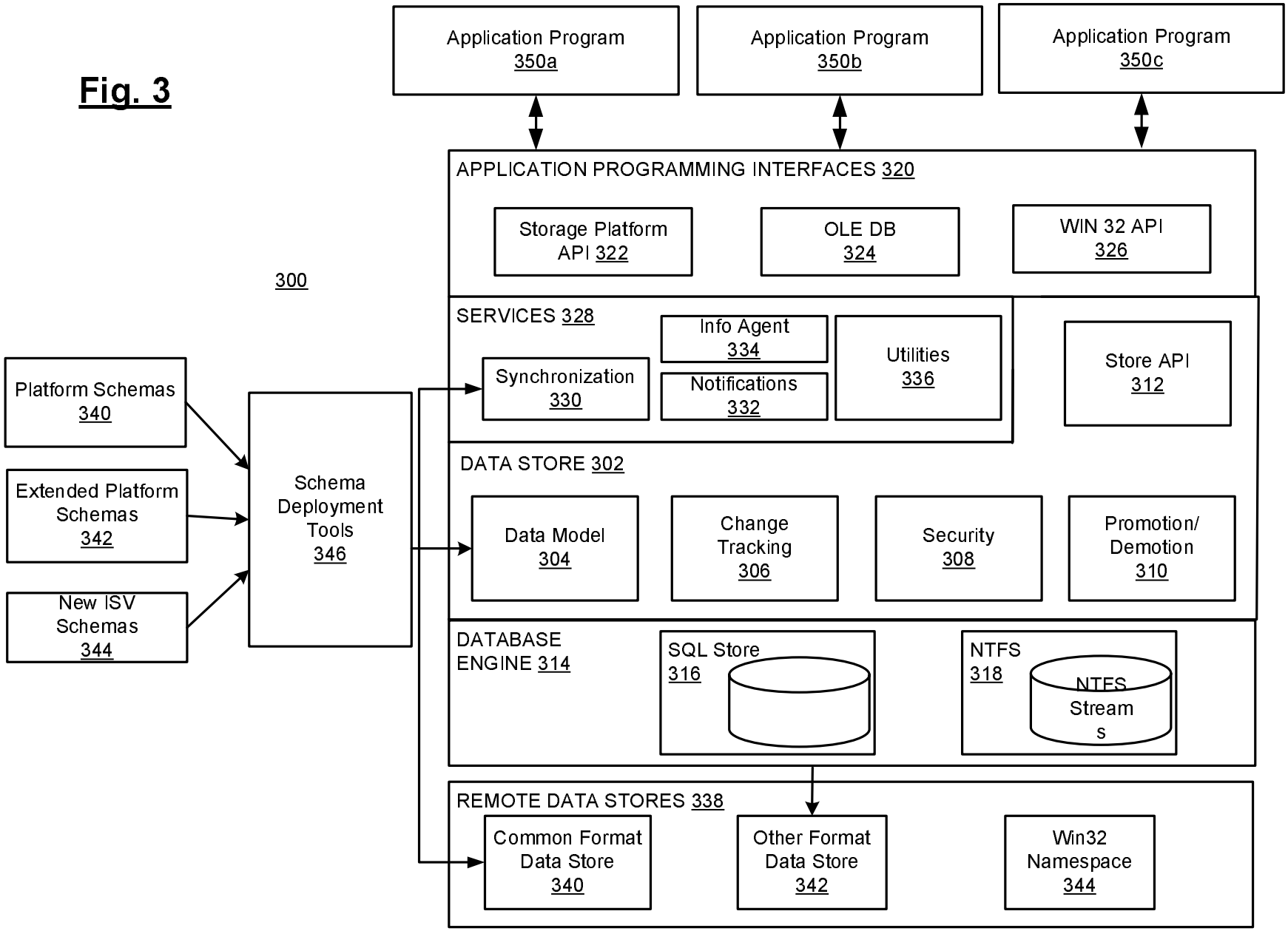

Application Program 350a
Application Program 350b
Application Program 350c
APPLICATION PROGRAMMING INTERFACES 320
Storage Platform API 322
OLE DB 324
WIN 32 API 326
300
SERVICES 328
Info Agent 334
Synchronization 330
Notifications 332
Utilities 336
Store API 312
Platform Schemas 340
Extended Platform Schemas 342
New ISV Schemas 344
Schema Deployment Tools 346
DATA STORE 302
Data Model 304
Change Tracking 306
Security 308
Promotion/ Demotion 310
DATABASE ENGINE 314
SQL Store 316
NTFS 318
NTFS Streams
REMOTE DATA STORES 338
Common Format Data Store 340
Other Format Data Store 342
Win32 Namespace 344

FIG. 4

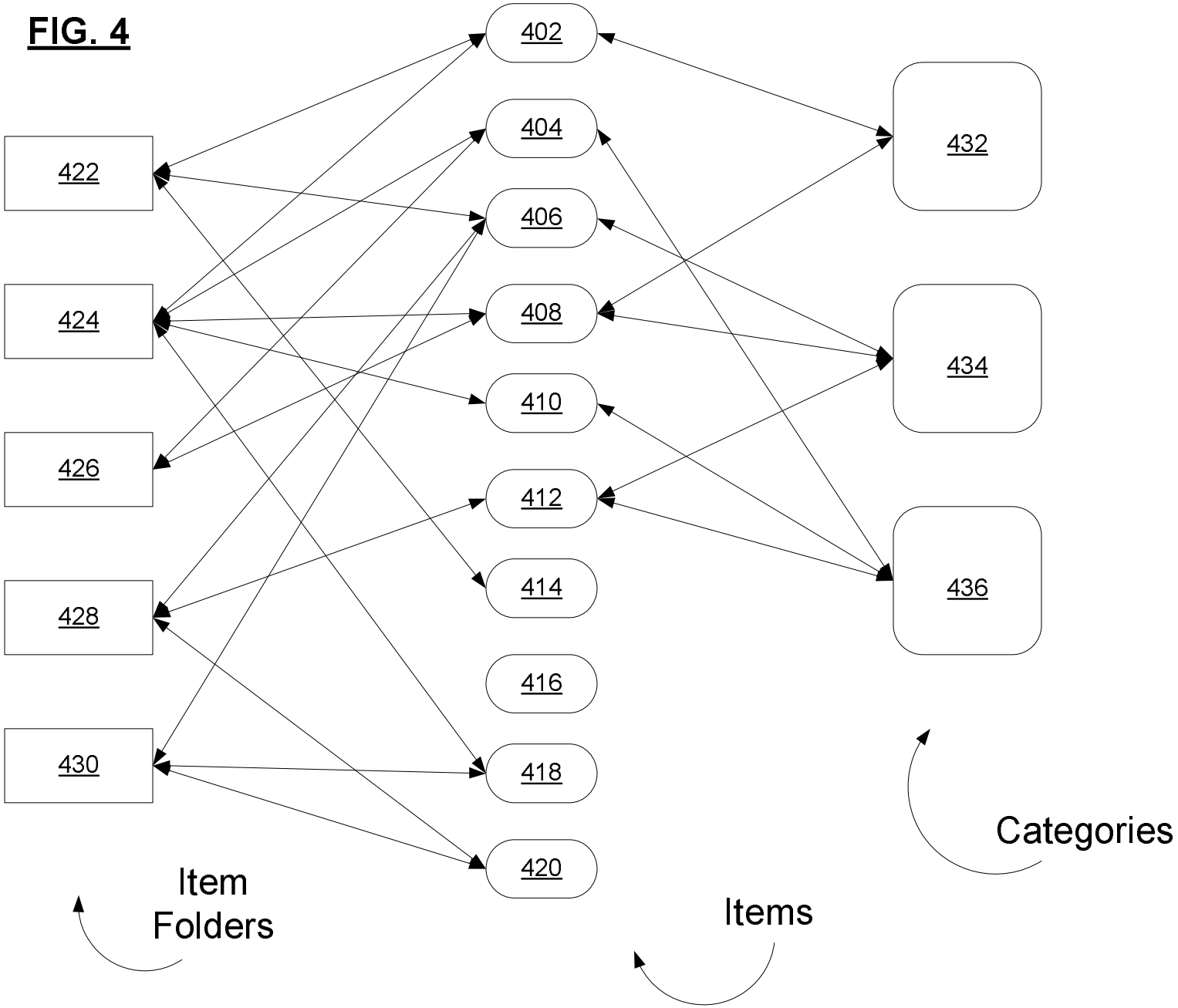

402
404
406
408
410
412
414
416
418
420
422
424
426
428
430
432
434
436
Item Folders
Items
Categories

FIG. 5A

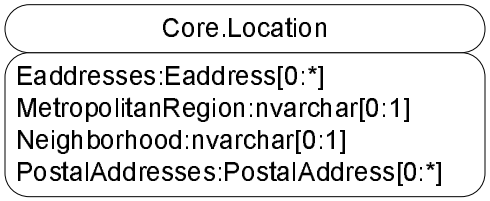


FIG. 5B

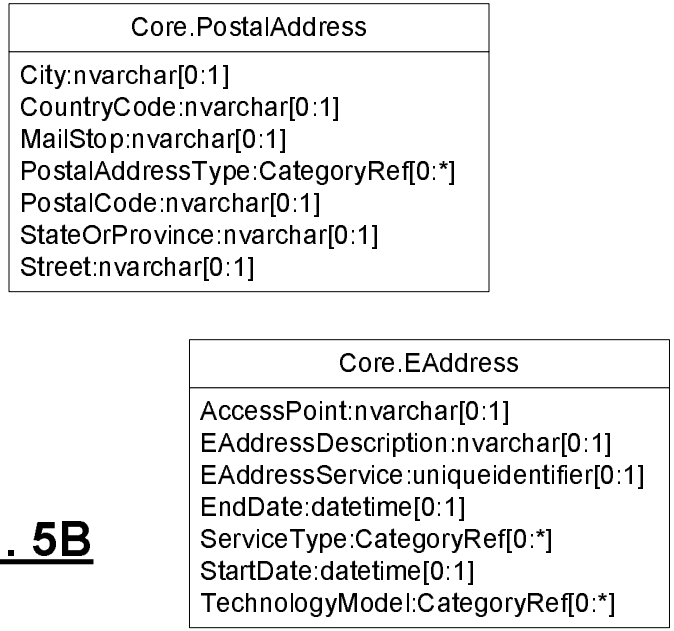


FIG. 5C

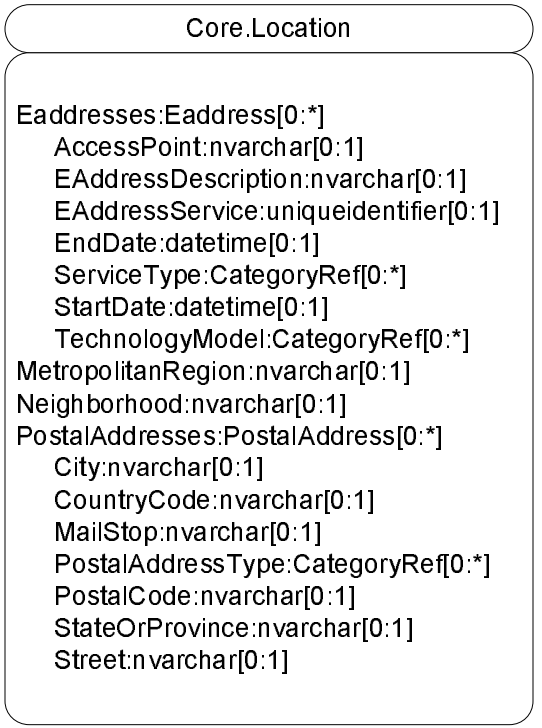
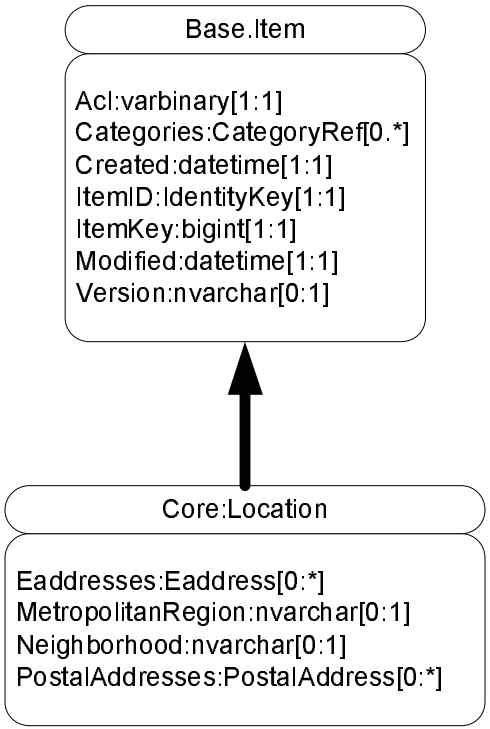


FIG. 6A


Base.Item
Acl:varbinary[1:1]
Categories:CategoryRef[0.*]
Created:datetime[1:1]
ItemID:IdentityKey[1:1]
ItemKey:bigint[1:1]
Modified:datetime[1:1]
Version:nvarchar[0:1]
Core:Location
Eaddresses:Eaddress[0:*]
MetropolitanRegion:nvarchar[0:1]
Neighborhood:nvarchar[0:1]
PostalAddresses:PostalAddress[0:*]

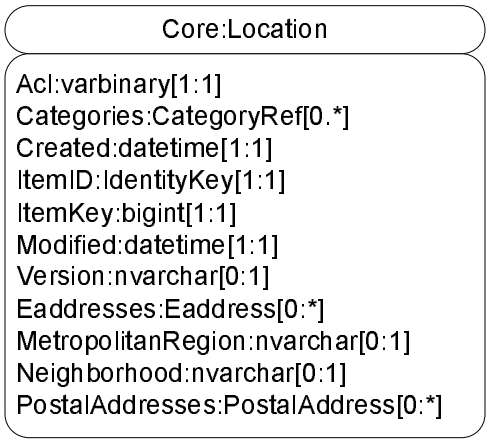

Core:Location
Acl:varbinary[1:1]
Categories:CategoryRef[0.*]
Created:datetime[1:1]
ItemID:IdentityKey[1:1]
ItemKey:bigint[1:1]
Modified:datetime[1:1]
Version:nvarchar[0:1]
Eaddresses:Eaddress[0:*]
MetropolitanRegion:nvarchar[0:1]
Neighborhood:nvarchar[0:1]
PostalAddresses:PostalAddress[0:*]

FIG. 6B

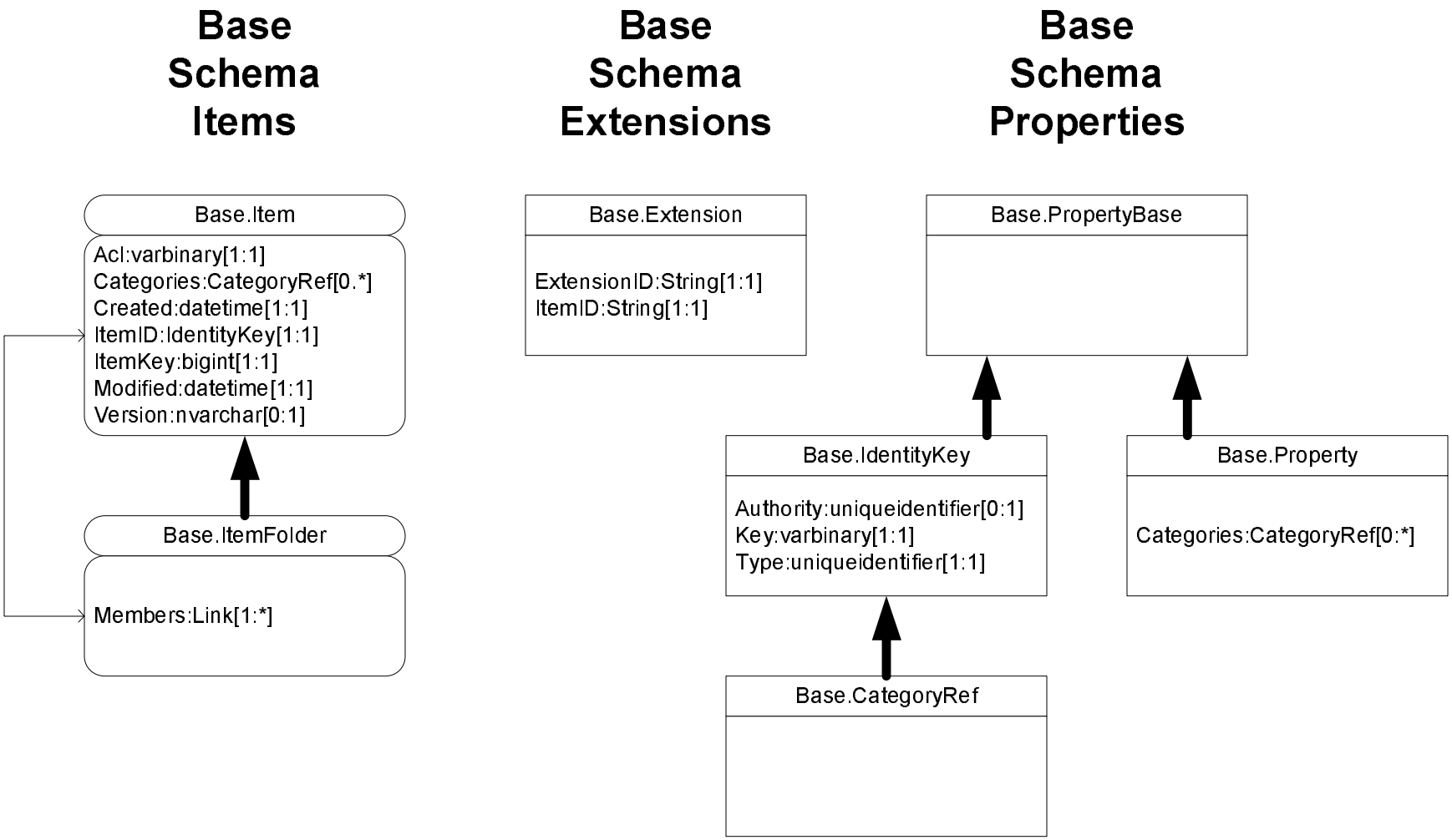

Base Schema Items
Base Schema Extensions
Base Schema Properties
Base.Item
Acl:varbinary[1:1]
Categories:CategoryRef[0.*]
Created:datetime[1:1]
ItemID:IdentityKey[1:1]
ItemKey:bigint[1:1]
Modified:datetime[1:1]
Version:nvarchar[0:1]
Base.ItemFolder
Members:Link[1:*]
Base.Extension
ExtensionID:String[1:1]
ItemID:String[1:1]
Base.PropertyBase
Base.IdentityKey
Authority:uniqueidentifier[0:1]
Key:varbinary[1:1]
Type:uniqueidentifier[1:1]
Base.Property
Categories:CategoryRef[0:*]
Base.CategoryRef

FIG. 7

FIG. 8A

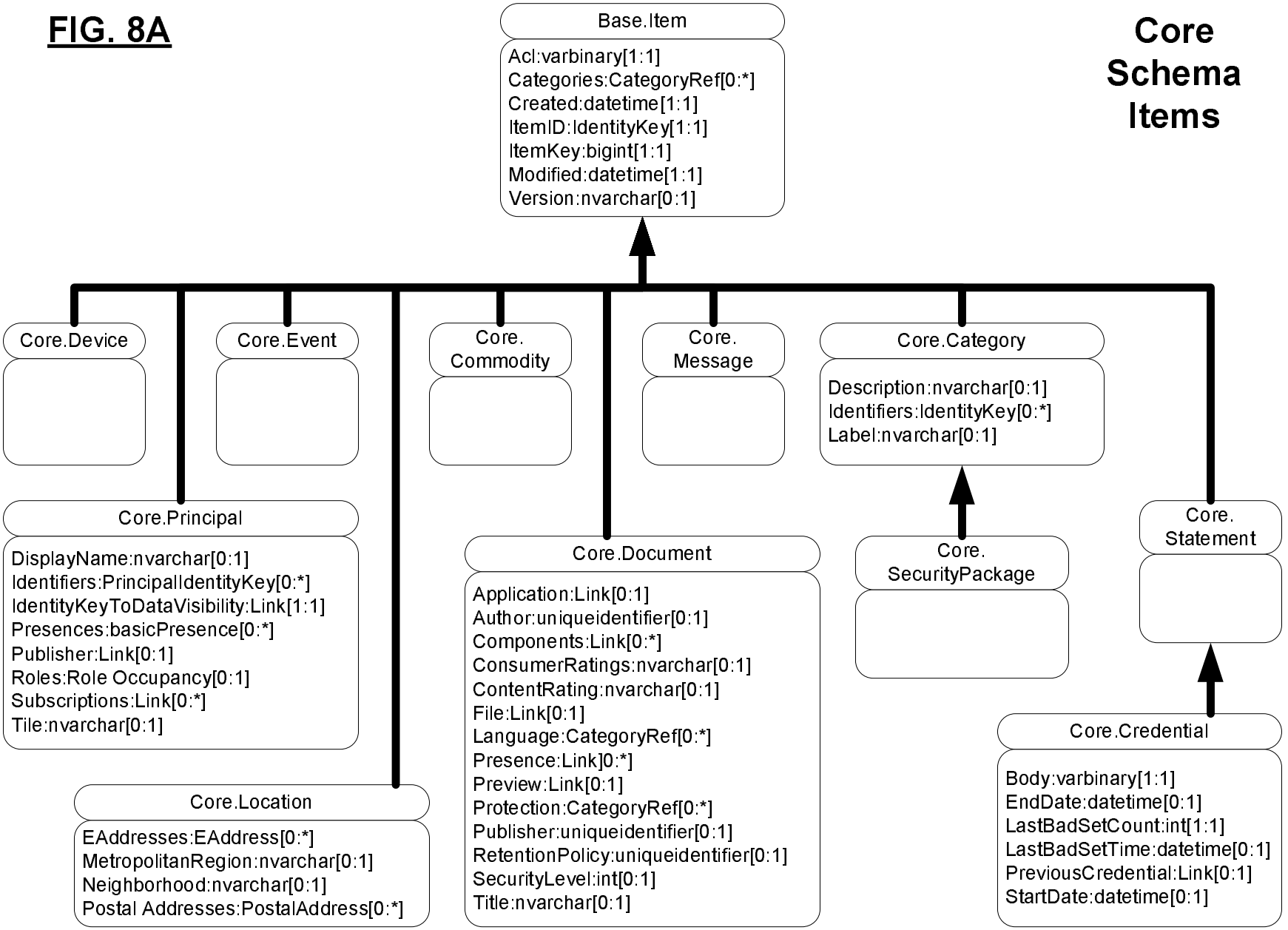
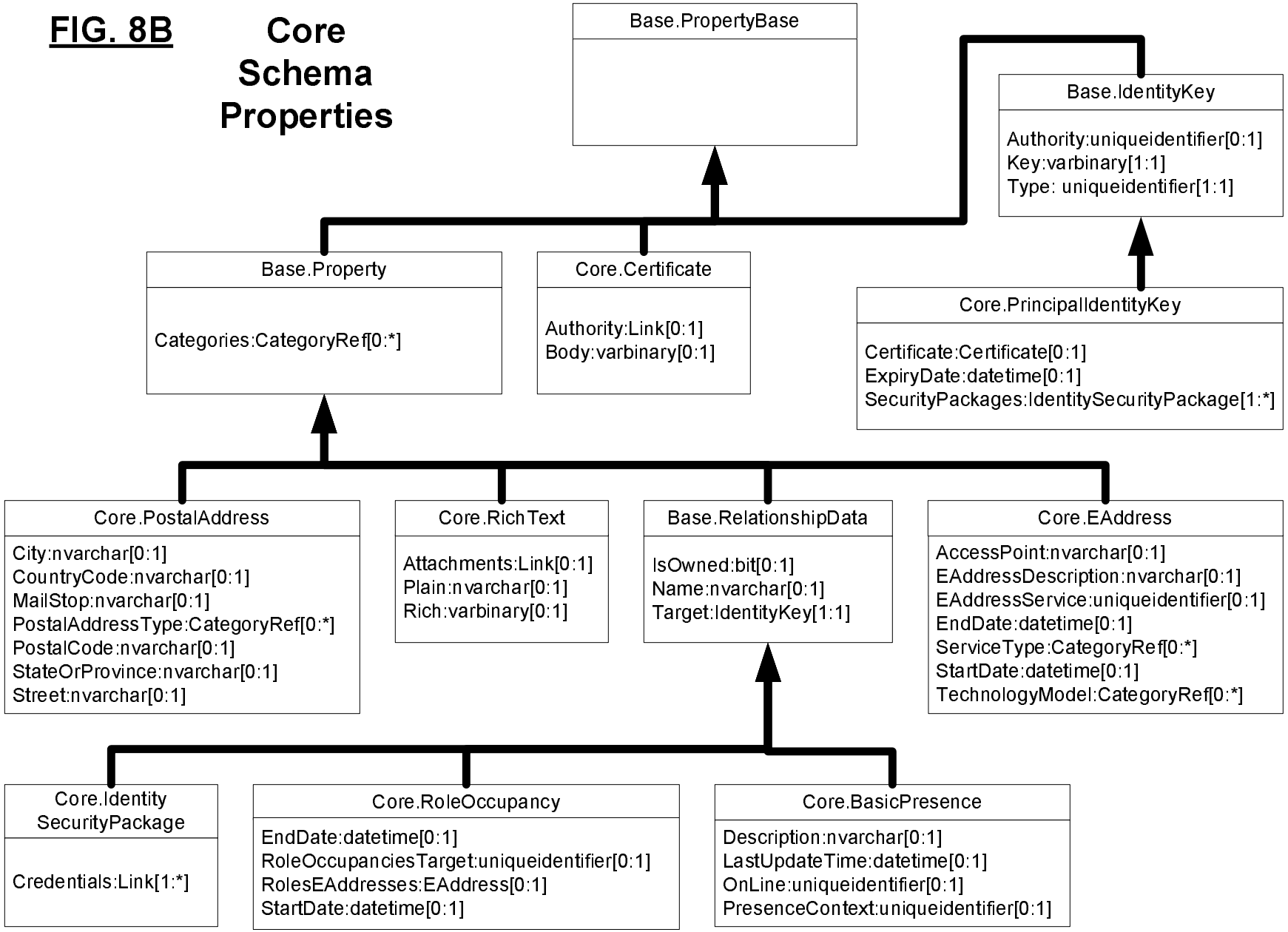

Base.Item
Acl:varbinary[1:1]
Categories:CategoryRef[0:*]
Created:datetime[1:1]
ItemID:IdentityKey[1:1]
ItemKey:bigint[1:1]
Modified:datetime[1:1]
Version:nvarchar[0:1]
Core Schema Items
Core.Device
Core.Event
Core. Commodity
Core. Message
Core.Category
Description:nvarchar[0:1]
Identifiers:IdentityKey[0:*]
Label:nvarchar[0:1]
Core.Principal
DisplayName:nvarchar[0:1]
Identifiers:PrincipalIdentityKey[0:*]
IdentityKeyToDataVisibility:Link[1:1]
Presences:basicPresence[0:*]
Publisher:Link[0:1]
Roles:Role Occupancy[0:1]
Subscriptions:Link[0:*]
Tile:nvarchar[0:1]
Core.Location
EAddresses:EAddress[0:*]
MetropolitanRegion:nvarchar[0:1]
Neighborhood:nvarchar[0:1]
Postal Addresses:PostalAddress[0:*]
Core.Document
Application:Link[0:1]
Author:uniqueidentifier[0:1]
Components:Link[0:*]
ConsumerRatings:nvarchar[0:1]
ContentRating:nvarchar[0:1]
File:Link[0:1]
Language:CategoryRef[0:*]
Presence:Link]0:*]
Preview:Link[0:1]
Protection:CategoryRef[0:*]
Publisher:uniqueidentifier[0:1]
RetentionPolicy:uniqueidentifier[0:1]
SecurityLevel:int[0:1]
Title:nvarchar[0:1]
Core. SecurityPackage
Core. Statement
Core.Credential
Body:varbinary[1:1]
EndDate:datetime[0:1]
LastBadSetCount:int[1:1]
LastBadSetTime:datetime[0:1]
PreviousCredential:Link[0:1]
StartDate:datetime[0:1]

FIG. 8B **Core Schema Properties**



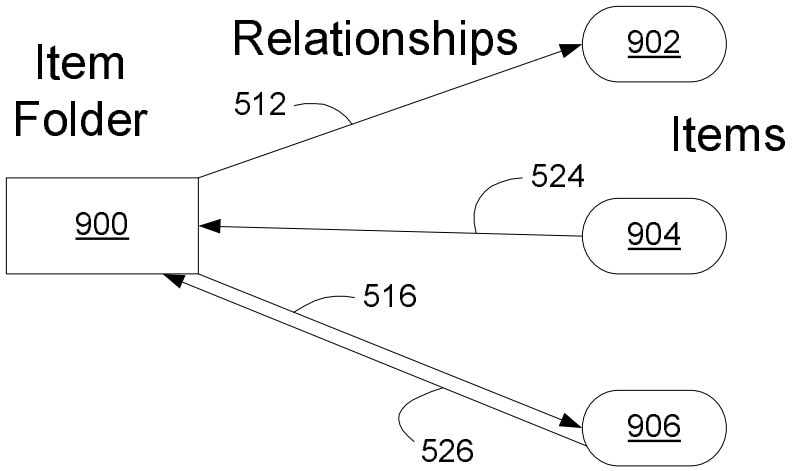
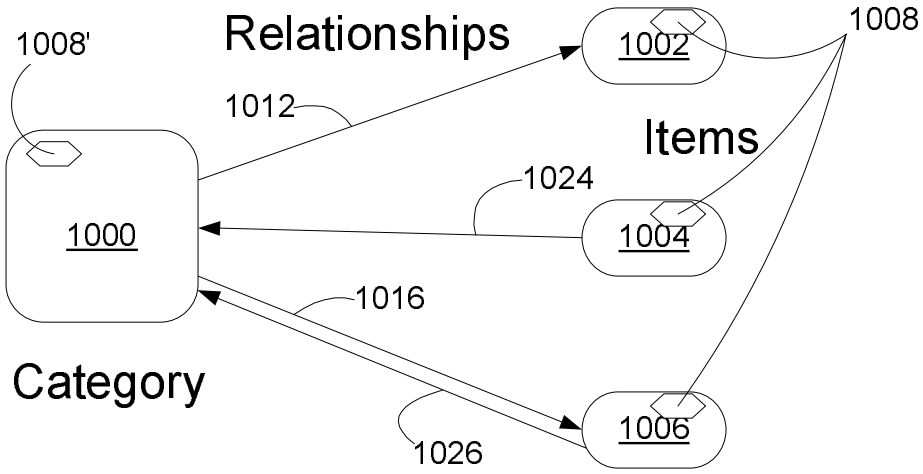

Item
Folder
Relationships
902
512
Items
524
900
904
516
906
526

FIG. 9

FIG. 10


1008'
Relationships
1002
1008
1012
Items
1024
1000
1004
1016
Category
1006
1026

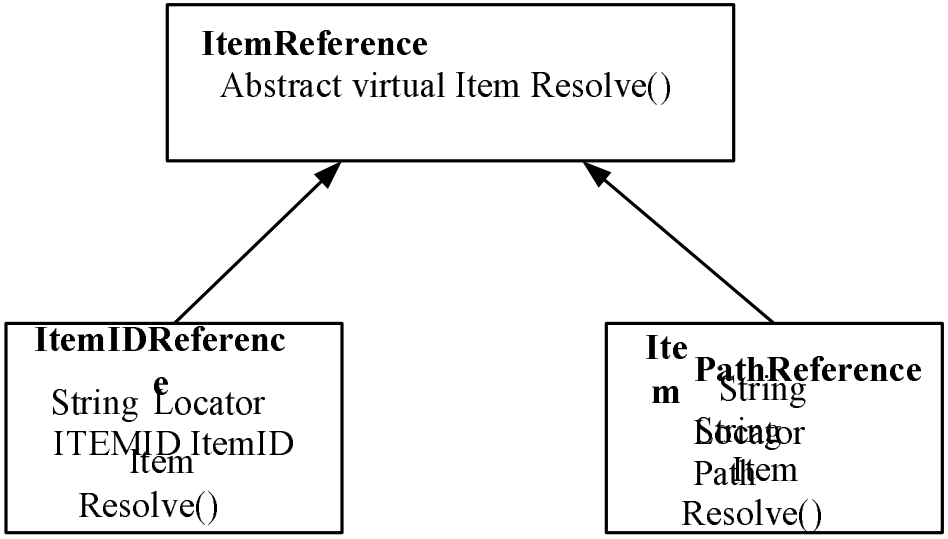

ItemReference
Abstract virtual Item Resolve()
ItemIDReference
String ITEMID
Item Resolve()
Item
String ItemID
Locator Path
Item Resolve()
PathReference

FIG. 11

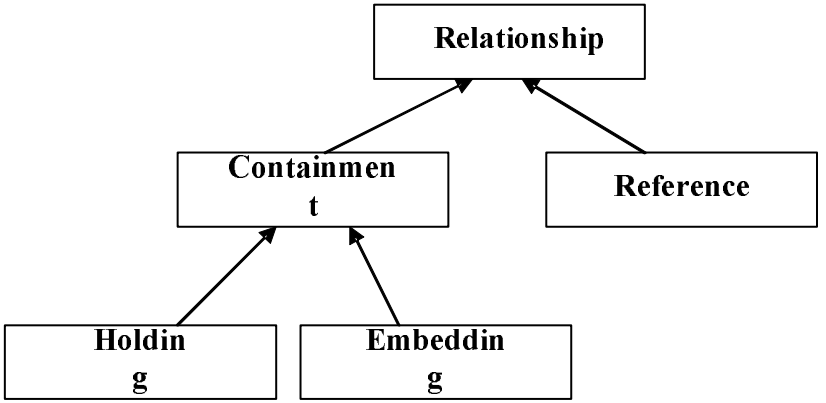

Relationship
Containment
Reference
Holding
Embedding

FIG. 12

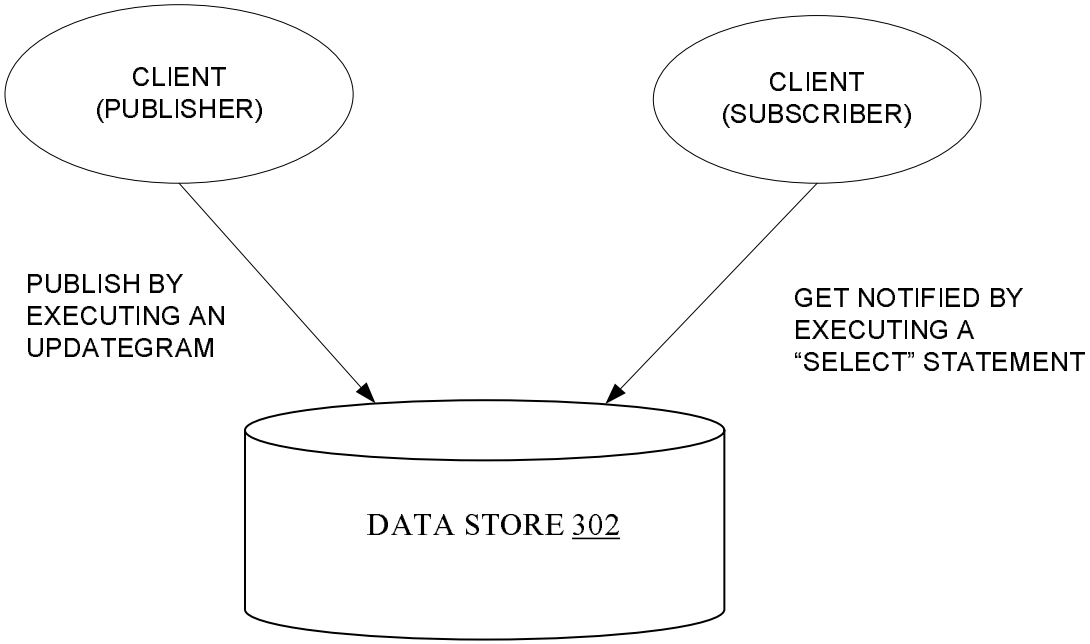

CLIENT
(PUBLISHER)
CLIENT
(SUBSCRIBER)
PUBLISH BY
EXECUTING AN
UPDATEGRAM
GET NOTIFIED BY
EXECUTING A
"SELECT" STATEMENT
DATA STORE 302

FIG. 13

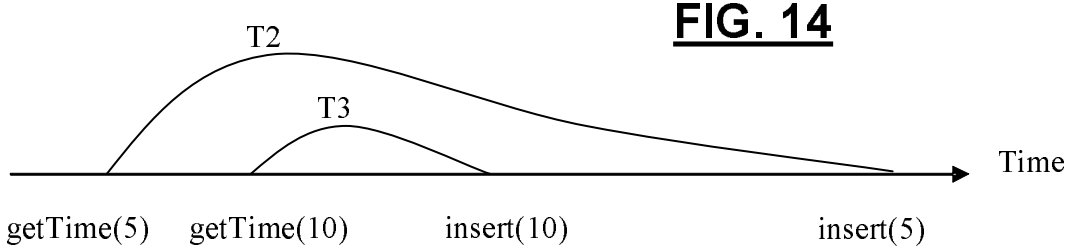

T2
T3
Time
getTime(5)
getTime(10)
insert(10)
insert(5)

FIG. 14

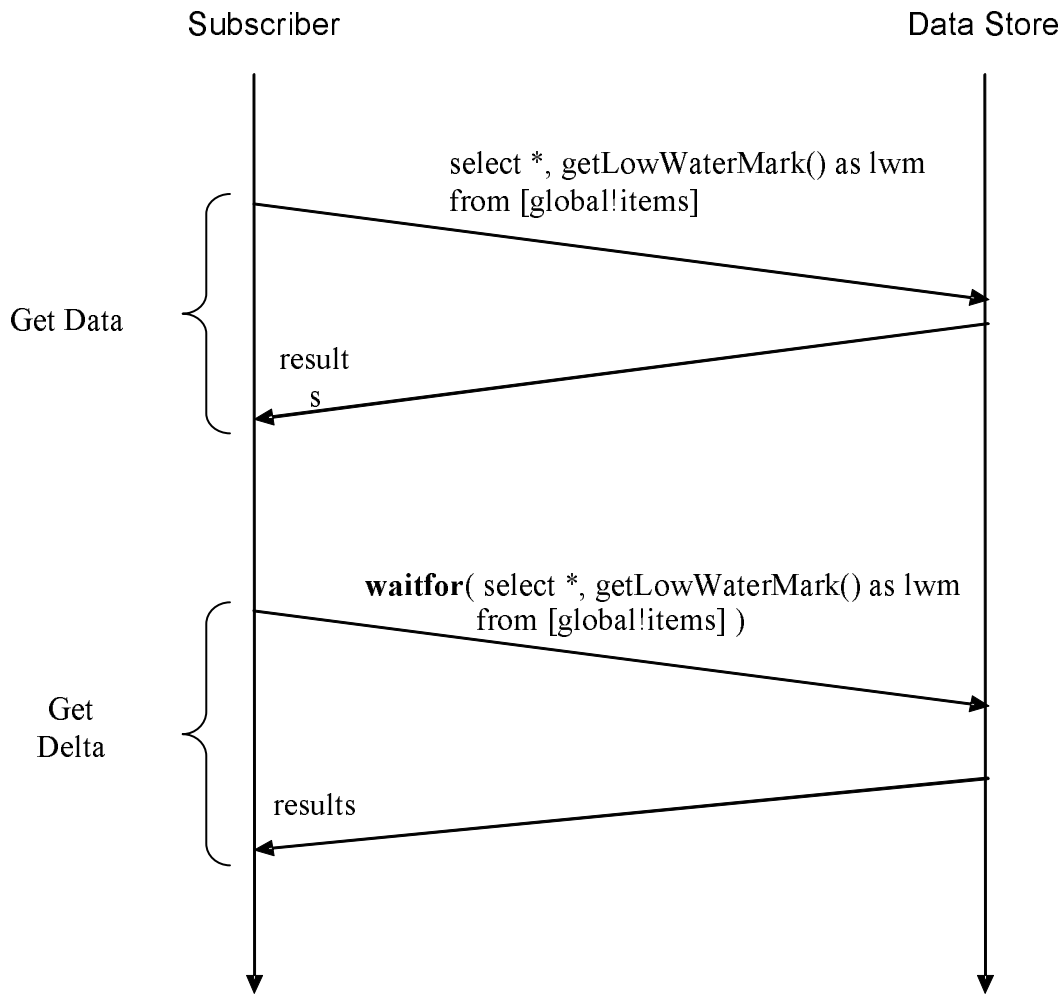

Subscriber
Data Store
select *, getLowWaterMark() as lwm
from [global!items]
Get Data
result
s
waitfor(select *, getLowWaterMark() as lwm
from [global!items])
Get
Delta
results

FIG. 15

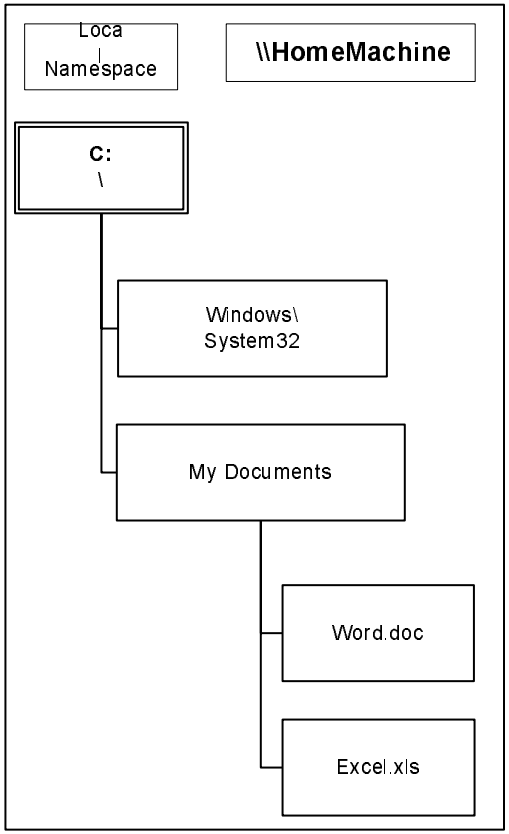

Loca
Namespace
\\HomeMachine
C:
\
Windows\
System32
My Documents
Word.doc
Excel.xls

FIG. 16

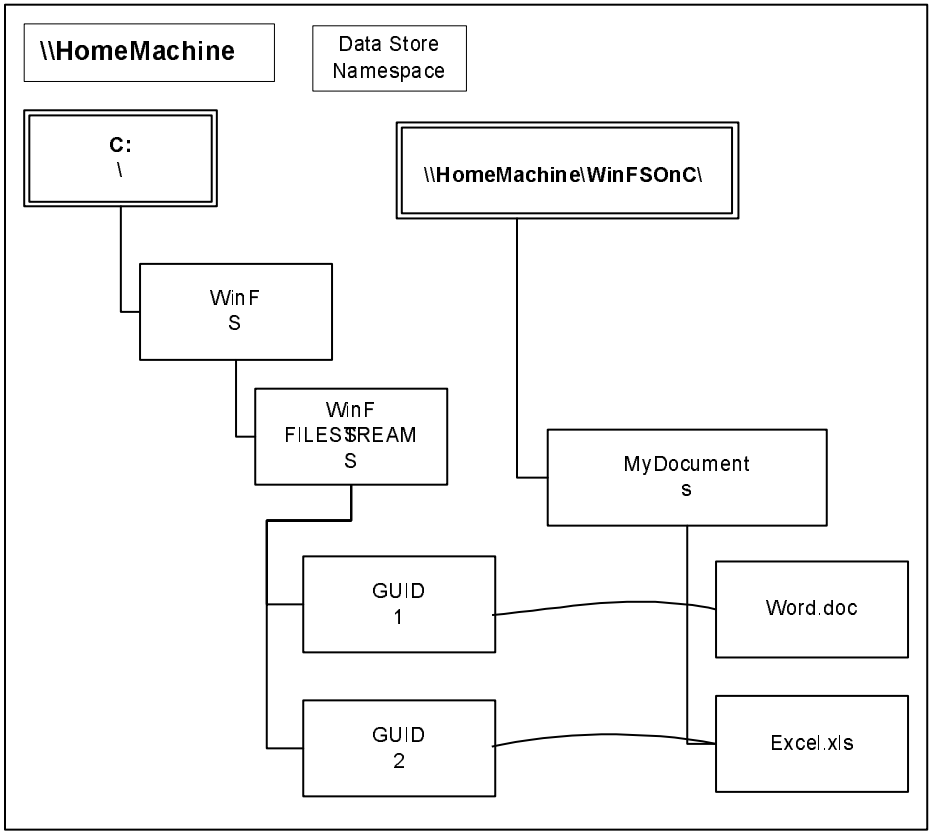

\\HomeMachine
Data Store
Namespace
C:
\
\\HomeMachine\WinFSOnC\
WinF
S
WinF
FILESTREAM
S
MyDocument
s
GUID
1
GUID
2
Word.doc
Excel.xls

FIG. 17

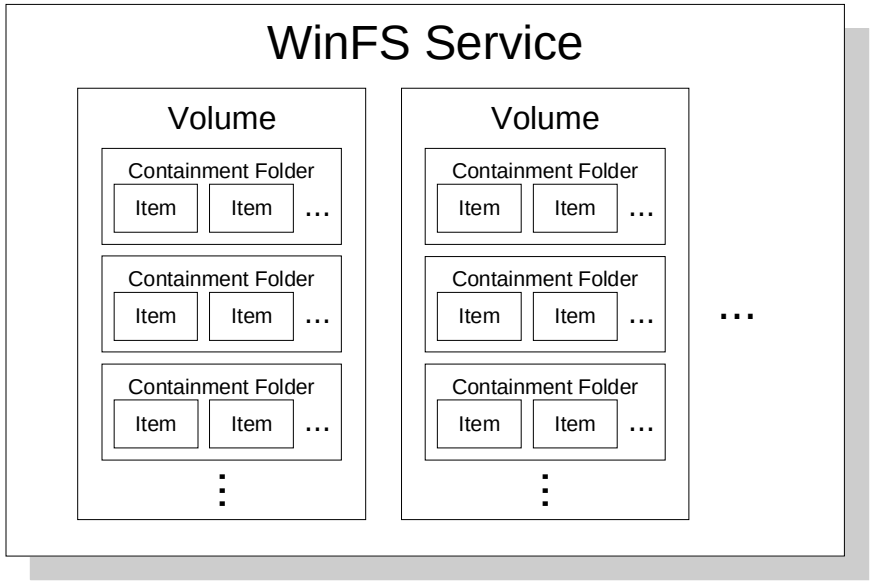

WinFS Service
Volume
Containment Folder
Item
Item
…
Containment Folder
Item
Item
…
Containment Folder
Item
Item
…
Volume
Containment Folder
Item
Item
…
Containment Folder
Item
Item
…
Containment Folder
Item
Item
…
…

FIG. 18

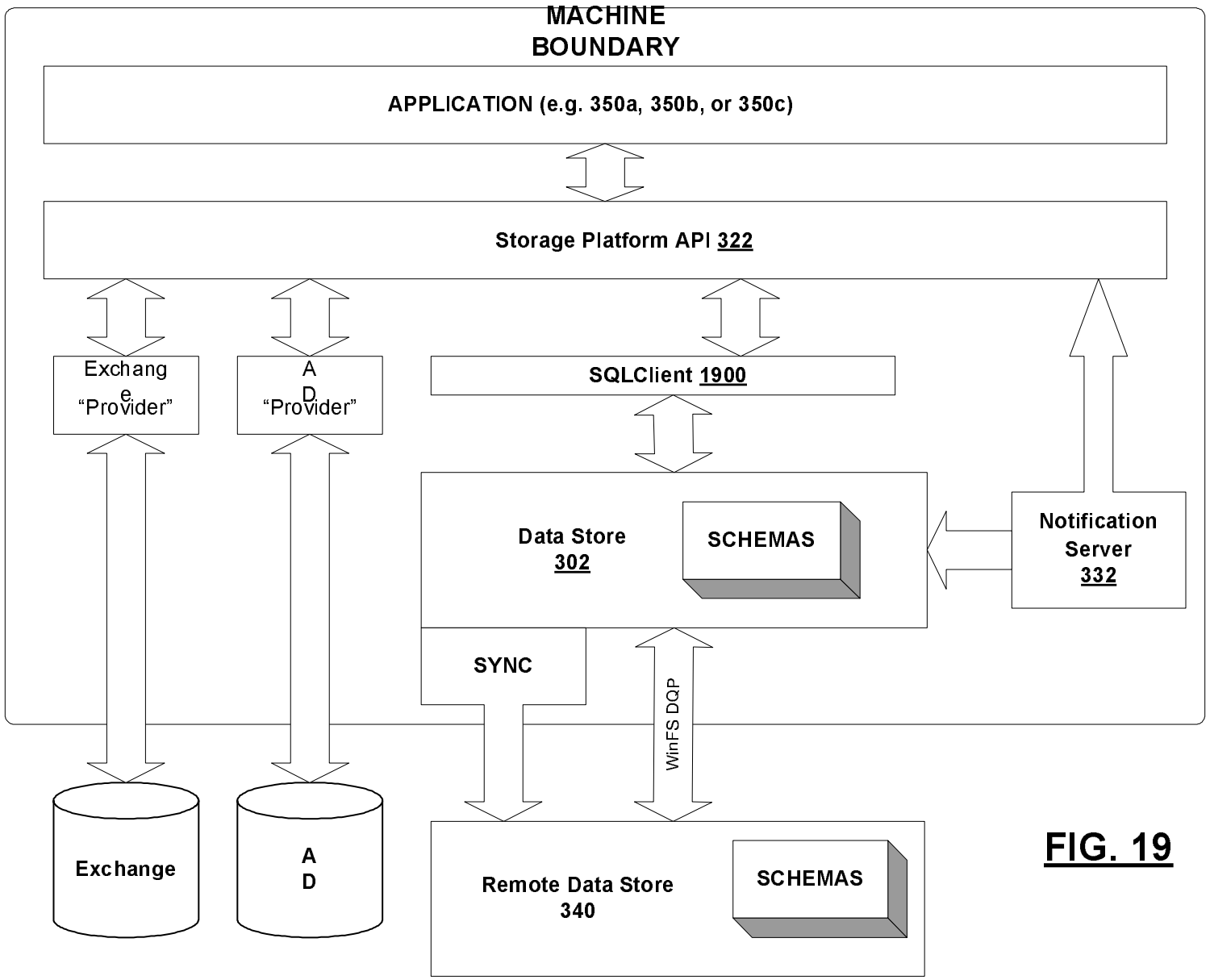

MACHINE BOUNDARY
APPLICATION (e.g. 350a, 350b, or 350c)
Storage Platform API 322
Exchange "Provider"
AD "Provider"
SQLClient 1900
Data Store 302
SCHEMAS
Notification Server 332
SYNC
WinFS DQP
Exchange
AD
Remote Data Store 340
SCHEMAS

FIG. 19

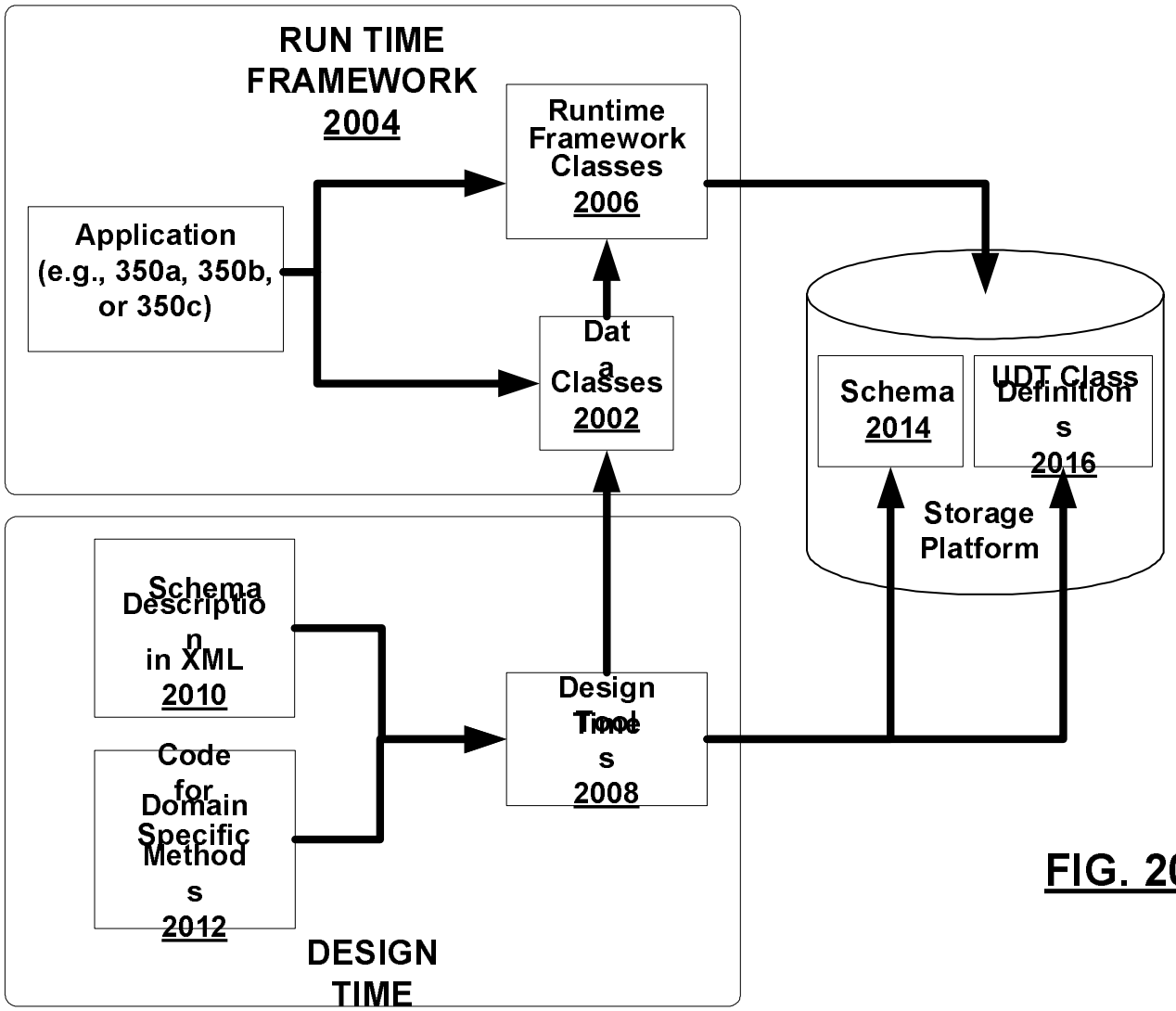

RUN TIME FRAMEWORK 2004
Runtime Framework Classes 2006
Application (e.g., 350a, 350b, or 350c)
Data Classes 2002
Schema 2014
UDT Class Definitions 2016
Storage Platform
Schema Description in XML 2010
Code for Domain Specific Methods 2012
Design Time Tools 2008
DESIGN TIME

FIG. 20

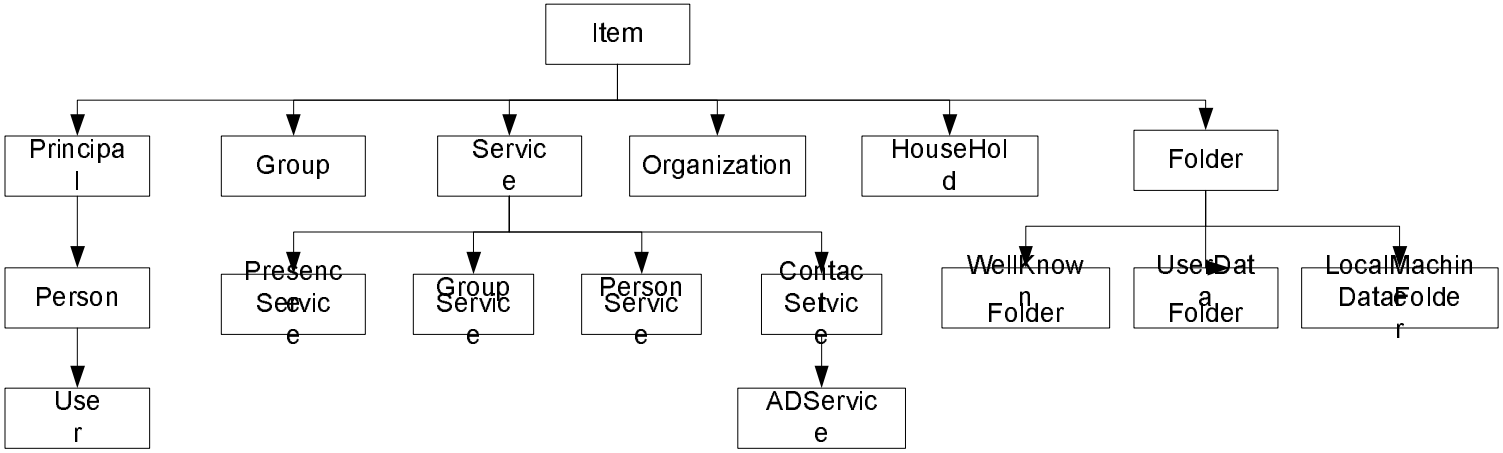

Item
Principal
Group
Service
Organization
HouseHold
Folder
Person
User
PresenceService
GroupService
PersonService
ContactService
ADService
WellKnownFolder
UserDataFolder
LocalMachinDataFolder

FIG. 21A

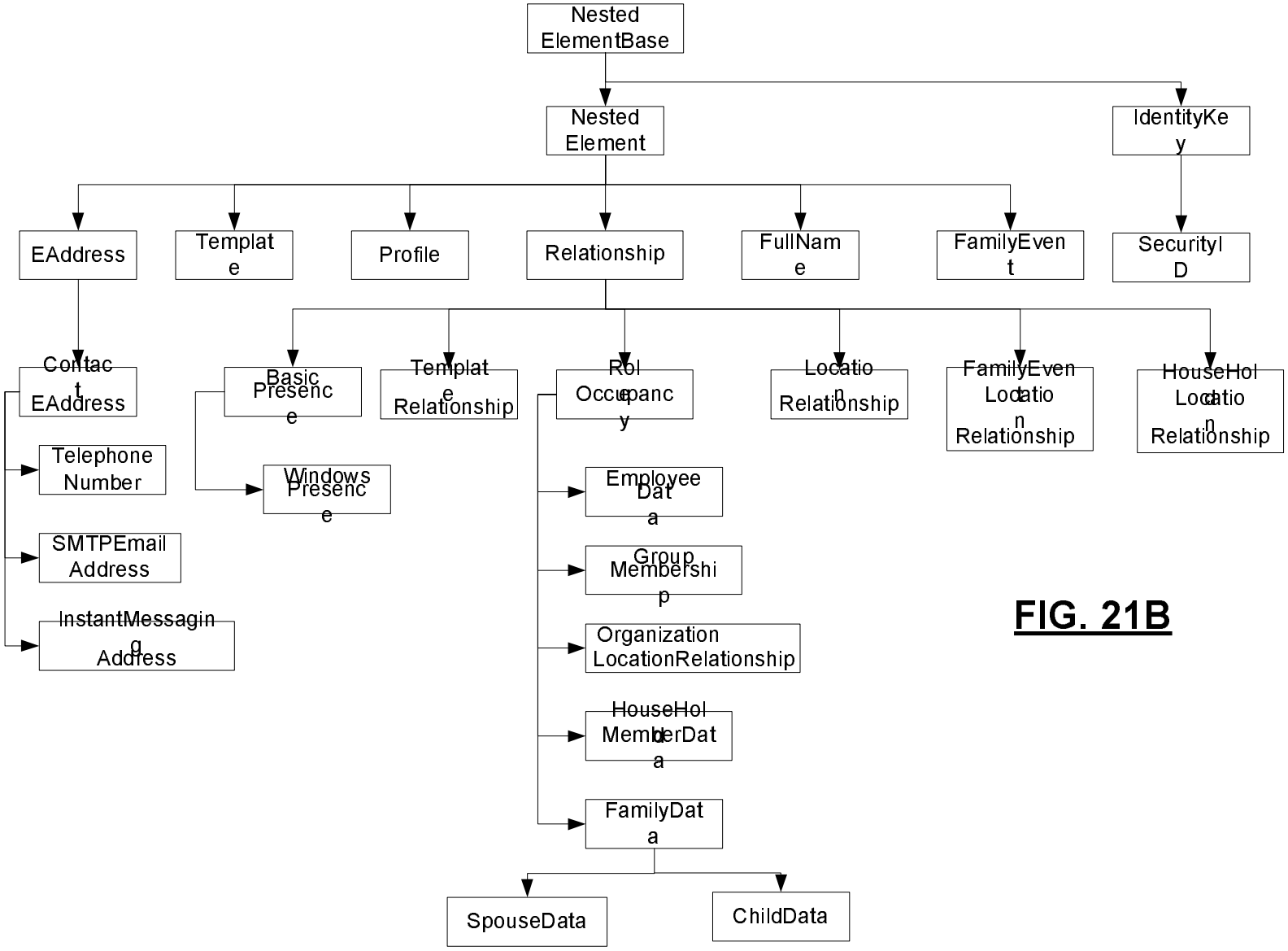

Nested ElementBase
Nested Element
IdentityKey
EAddress
Template
Profile
Relationship
FullName
FamilyEvent
SecurityID
Contact EAddress
Telephone Number
SMTPEmail Address
InstantMessaging Address
Basic Presence
Windows Presence
Template Relationship
Role Occupancy
Location Relationship
FamilyEvent Location Relationship
HouseHold Location Relationship
Employee Data
Group Membership
Organization LocationRelationship
HouseHold MemberData
FamilyData
SpouseData
ChildData

FIG. 21B

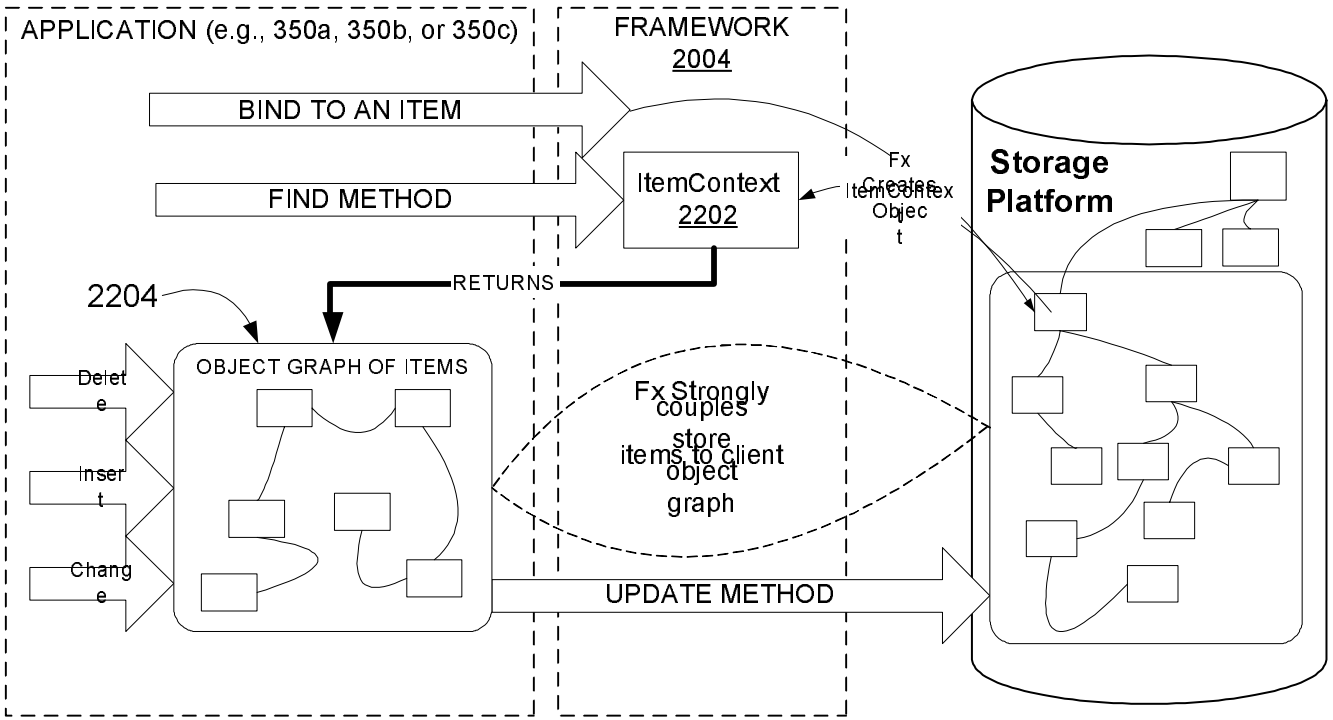

APPLICATION (e.g., 350a, 350b, or 350c)
FRAMEWORK
2004
BIND TO AN ITEM
FIND METHOD
ItemContext
2202
Fx Creates ItemContext Object
Storage Platform
RETURNS
2204
OBJECT GRAPH OF ITEMS
Delete
Insert
Change
Fx Strongly couples store items to client object graph
UPDATE METHOD

FIG. 22

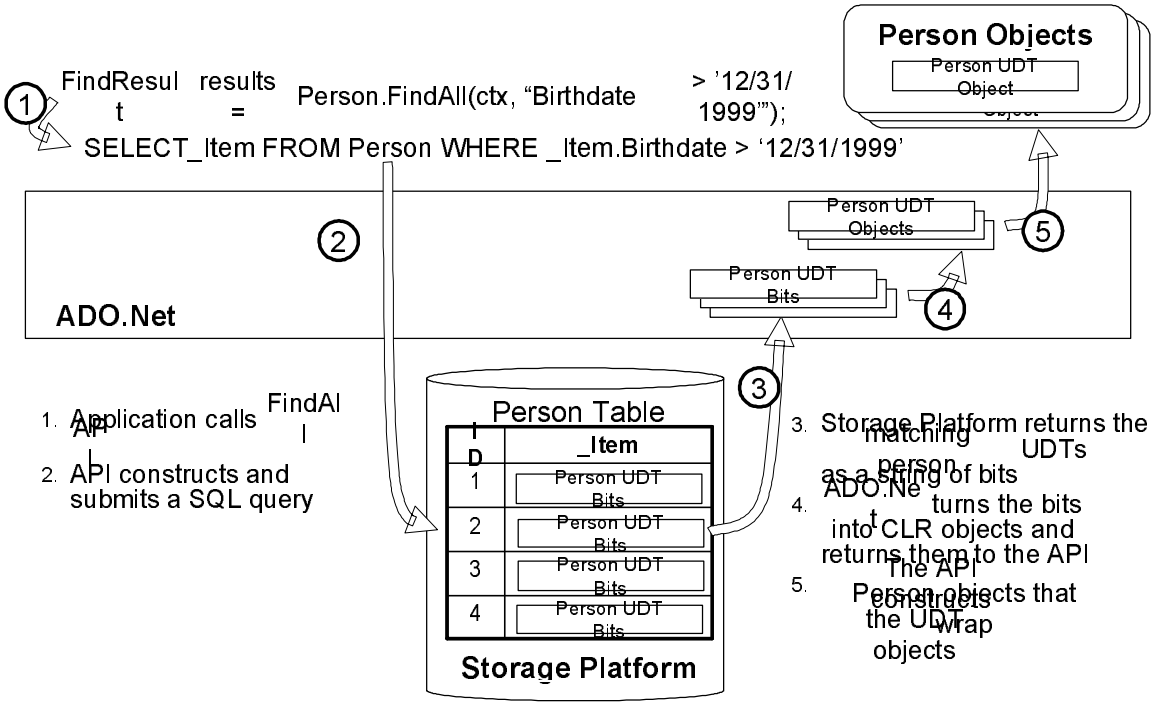
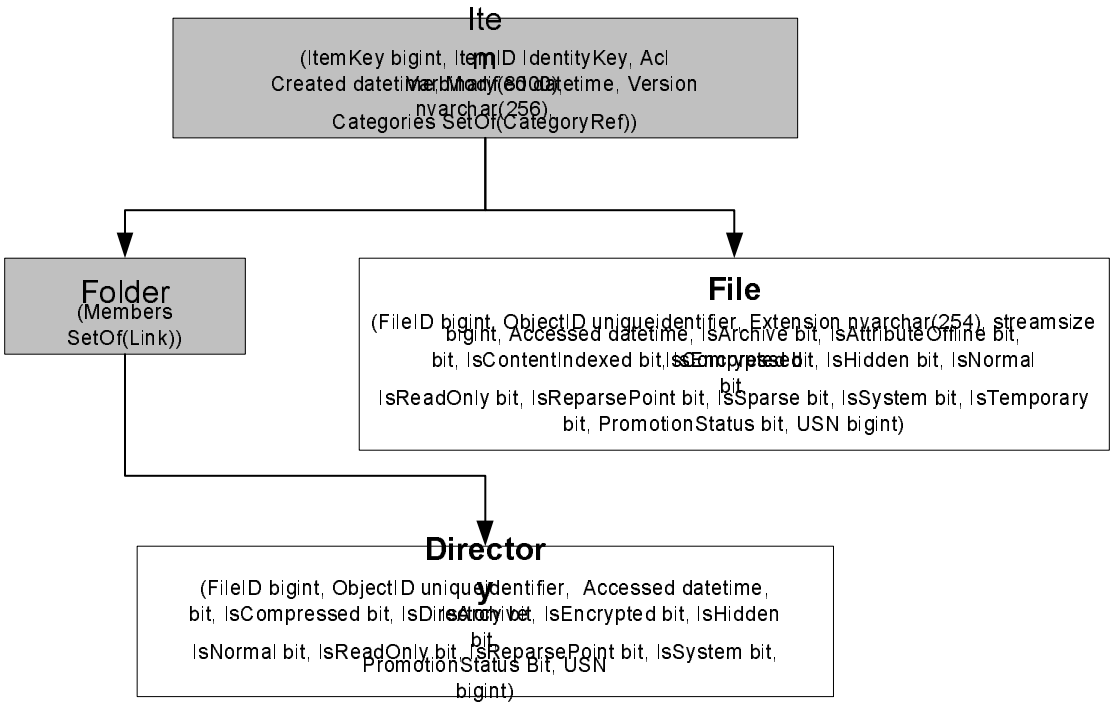

Person Objects
Person UDT Object
FindResult results = Person.FindAll(ctx, “Birthdate > ’12/31/1999’”);
SELECT_Item FROM Person WHERE _Item.Birthdate > ‘12/31/1999’
Person UDT Objects
Person UDT Bits
ADO.Net
1. Application calls FindAll API
2. API constructs and submits a SQL query
Person Table
ID
_Item
1
2
3
4
Person UDT Bits
Storage Platform
3. Storage Platform returns the matching UDTs as a string of bits
4. ADO.Net turns the bits into CLR objects and returns them to the API
5. The API constructs Person objects that wrap the UDT objects

FIG. 23

Hand coded
Auto-generated
Schema File:
An XML document containing:
Types in the schema
Specification of Constraints
SQL Indexes
Etc
1
Class Generator
(xlaCsc.exe)
2
Common Store Code :
Partial classes for types in the schema
These are store UDTs
3
Common Client Code :
Partial classes for types in the schema
4
Domain Behaviors, Client and Store :
Partial classes for methods on both store and client
5
Domain Behaviors, Store Side
Contains partial classes for domain behaviors that run on the server.
These become methods on the low level UDTs in the store
6
Compiler/ Linker
7
Compiler/ Linker
8
Compiler/ Linker
9
SQL Server UDT Assembly
The Find* methods are not part of the server assembly
11
API Classes Storage Platform
12
Classes Added Value
Compiler/ Linker
Behavior Value-add
10
DDL Command Generator
13
14

FIG. 24



Note: Grey boxes are types defined in the Base schema, but are shown here for the sake of completeness.

Items Defined in the Files Schema

FIG. 25

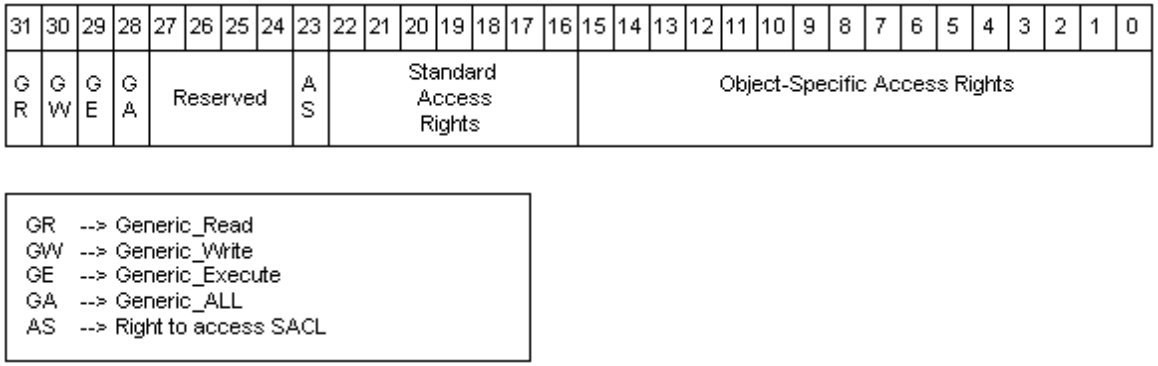
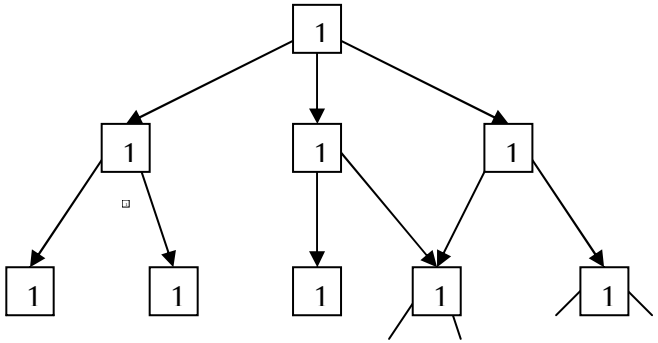
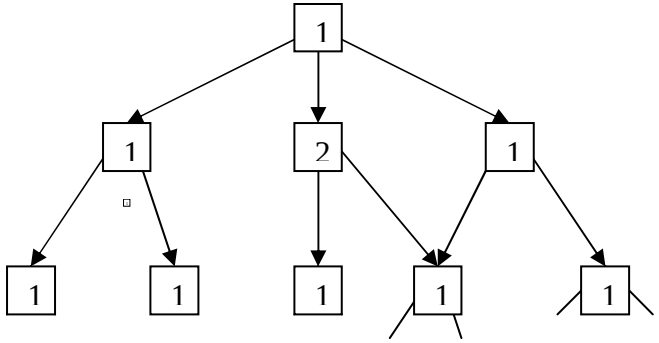

31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
GR
GW
GE
GA
Reserved
AS
Standard Access Rights
Object-Specific Access Rights
GR --> Generic_Read
GW --> Generic_Write
GE --> Generic_Execute
GA --> Generic_ALL
AS --> Right to access SACL

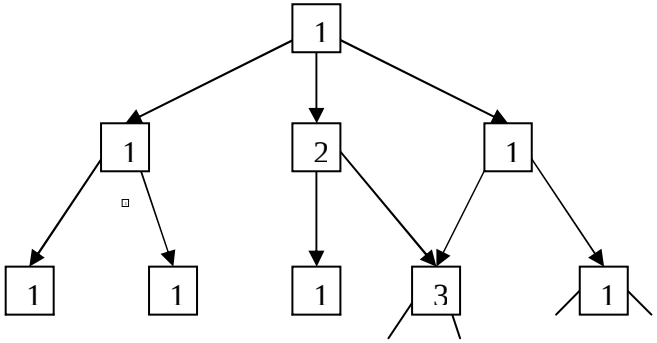
FIG. 26



(a)



(b)



(c)

FIG. 27

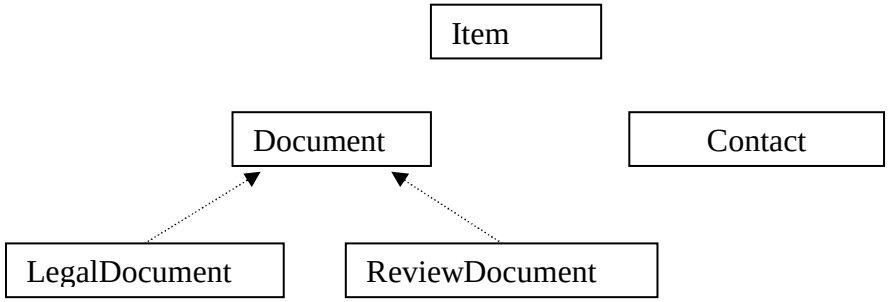

Item
Document
Contact
LegalDocument
ReviewDocument

FIG. 28

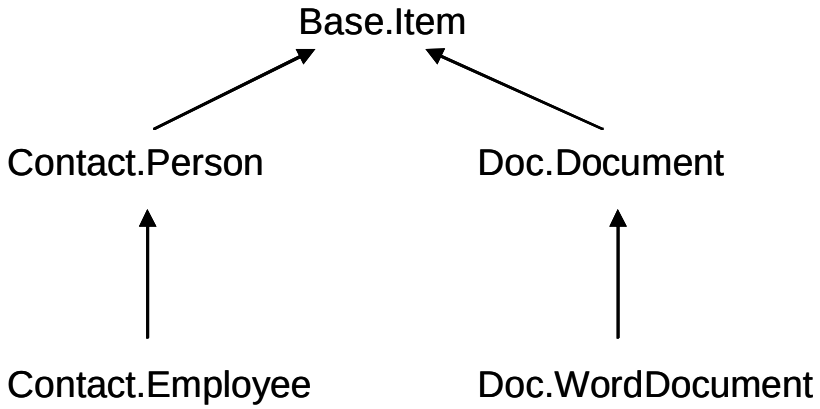

Base.Item
Contact.Person
Doc.Document
Contact.Employee
Doc.WordDocument

FIG. 29

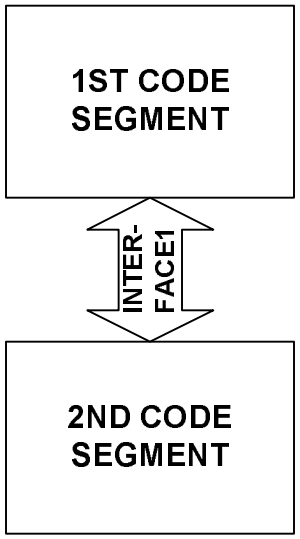


FIG. 30A

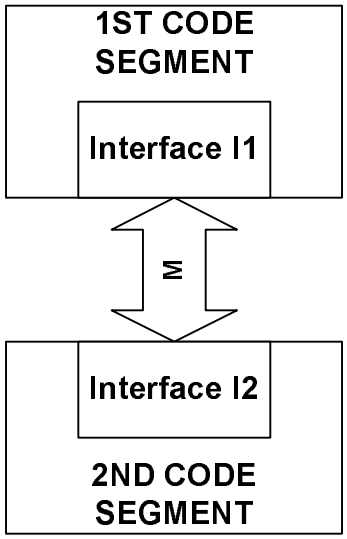


FIG. 30B

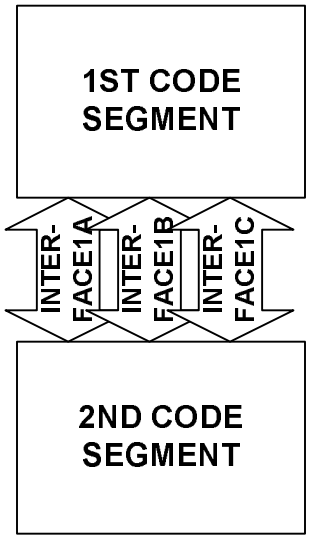


FIG. 31A

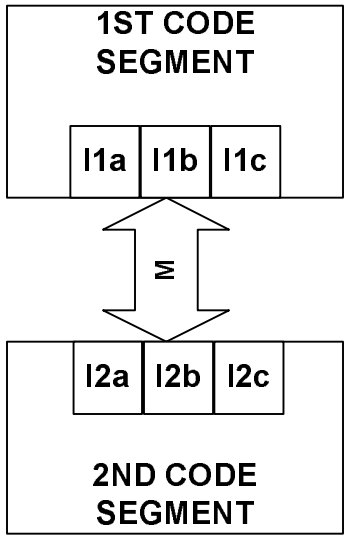


FIG. 31B

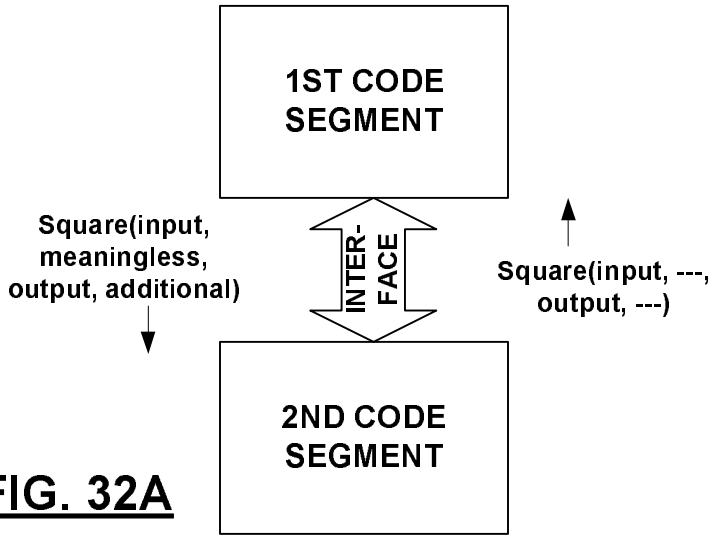


FIG. 32A

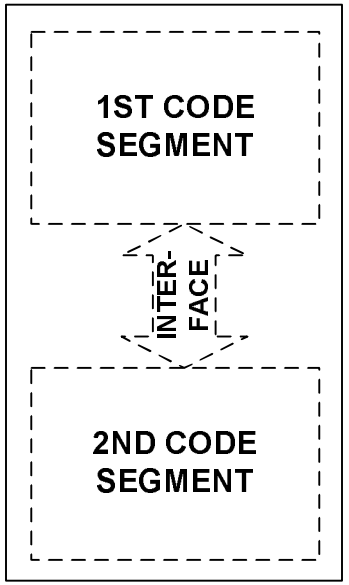


FIG. 33A

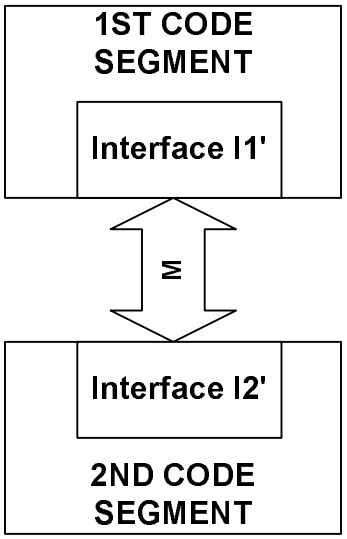


FIG. 32B

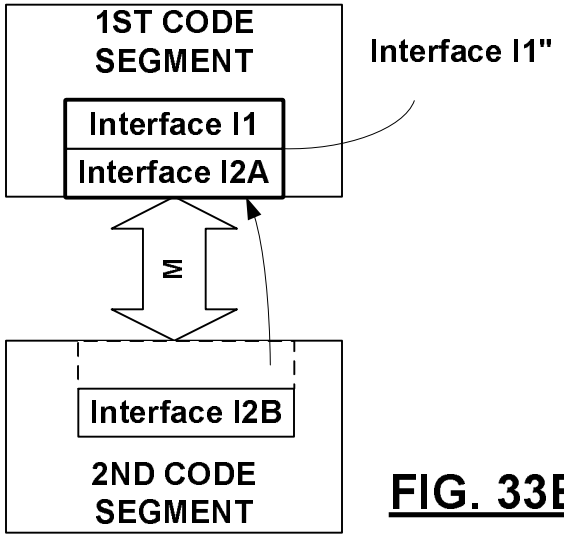


FIG. 33B

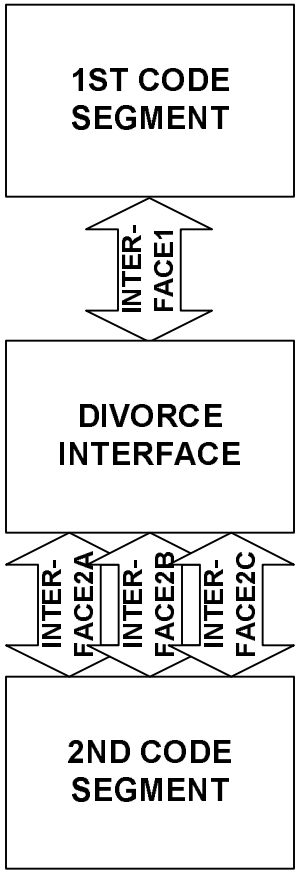


FIG. 34A

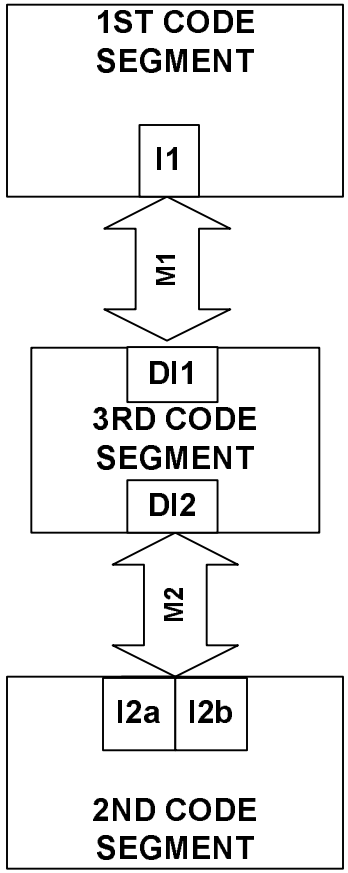


FIG. 34B

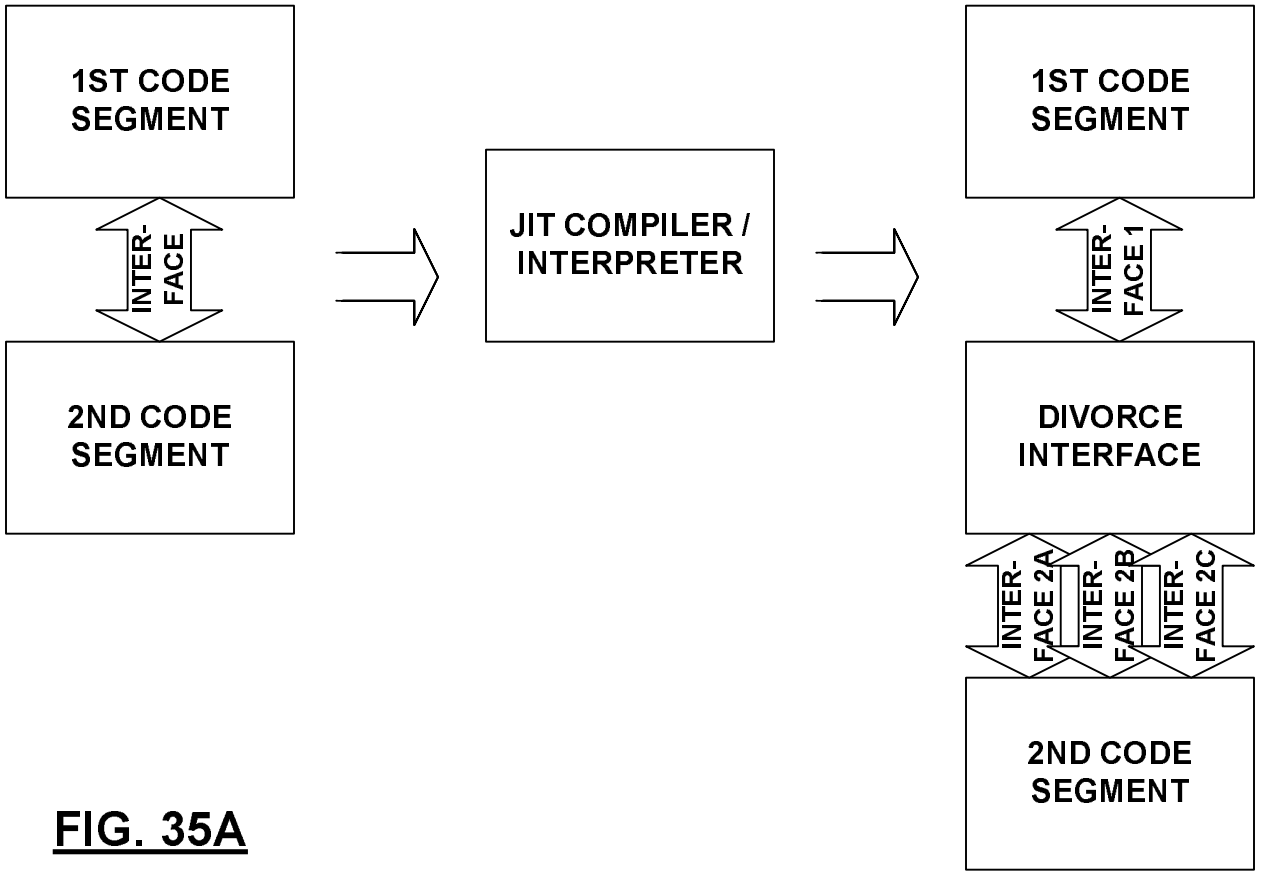

1ST CODE SEGMENT
INTER-FACE
2ND CODE SEGMENT
JIT COMPILER / INTERPRETER
1ST CODE SEGMENT
INTER-FACE 1
DIVORCE INTERFACE
INTER-FACE 2A
INTER-FACE 2B
INTER-FACE 2C
2ND CODE SEGMENT

FIG. 35A

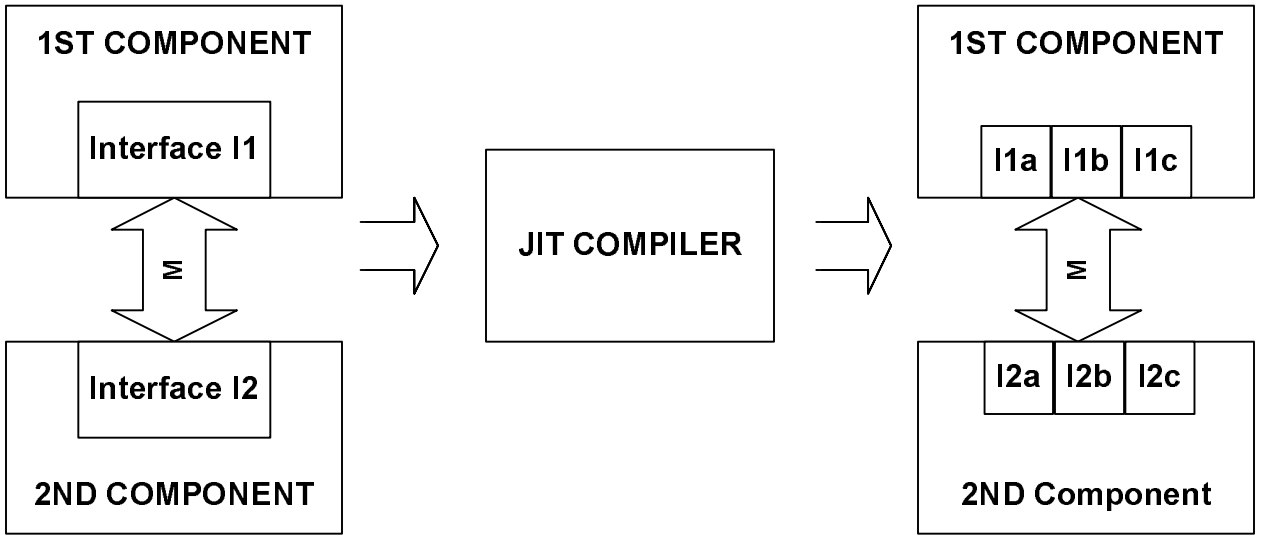

1ST COMPONENT
Interface I1
M
Interface I2
2ND COMPONENT
JIT COMPILER
1ST COMPONENT
I1a
I1b
I1c
M
I2a
I2b
I2c
2ND Component

FIG. 35B

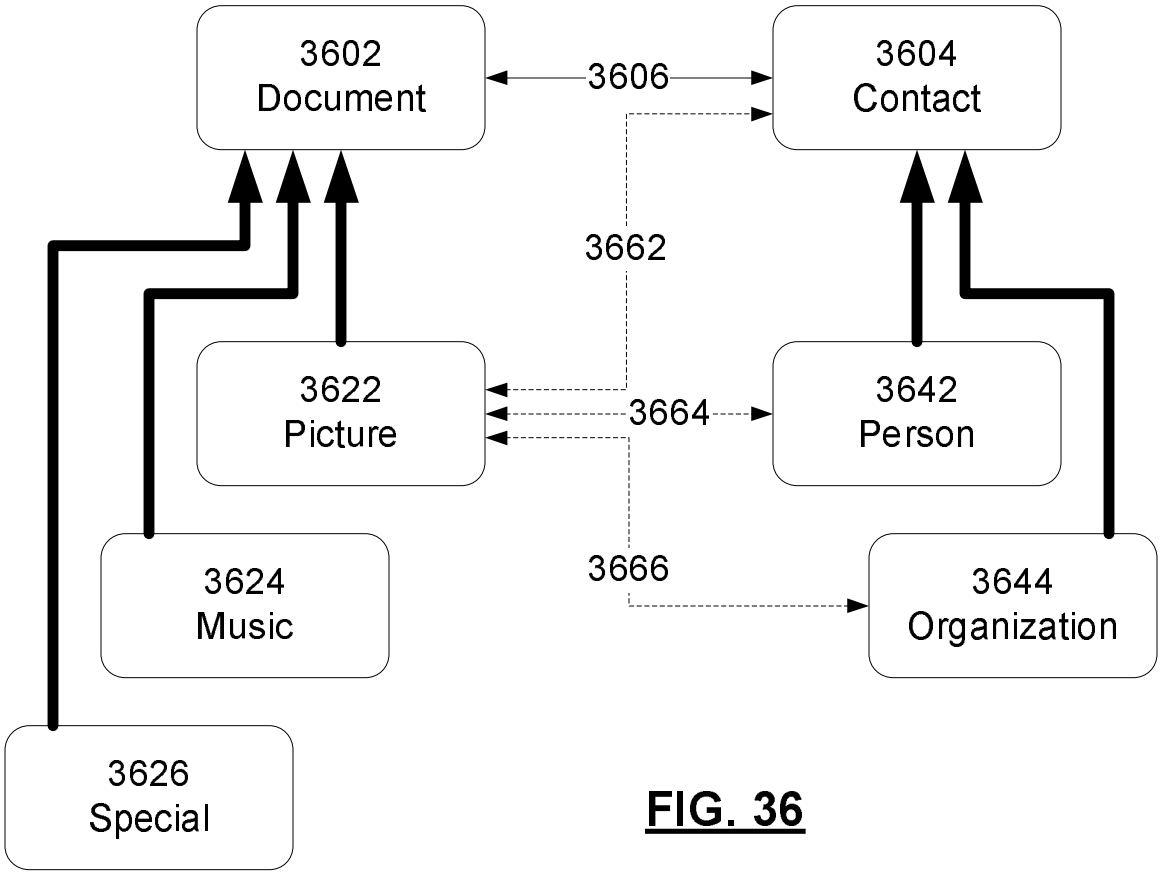
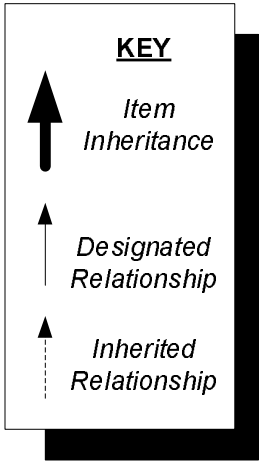

3602
Document
3606
3604
Contact
3662
3622
Picture
3664
3642
Person
3624
Music
3666
3644
Organization
3626
Special

FIG. 36


KEY
Item
Inheritance
Designated
Relationship
Inherited
Relationship

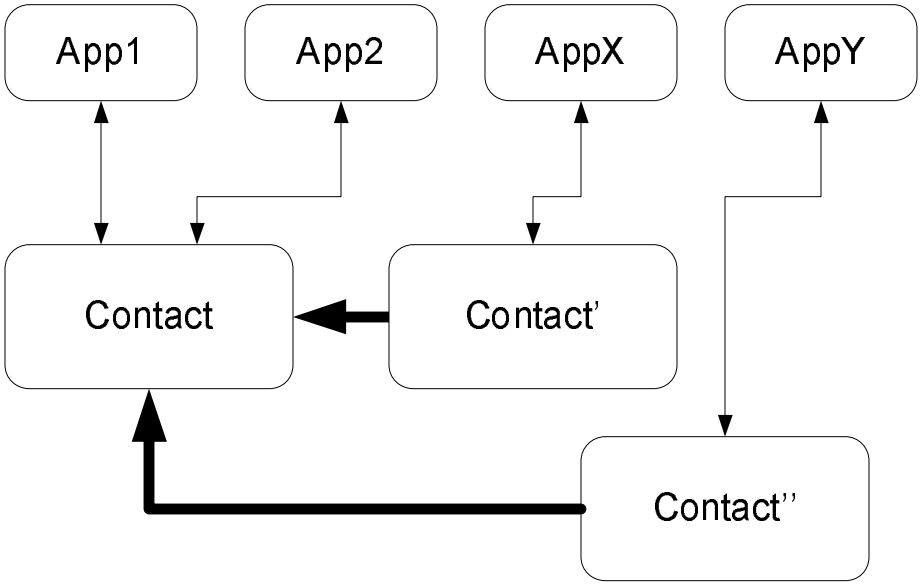


FIG. 37A

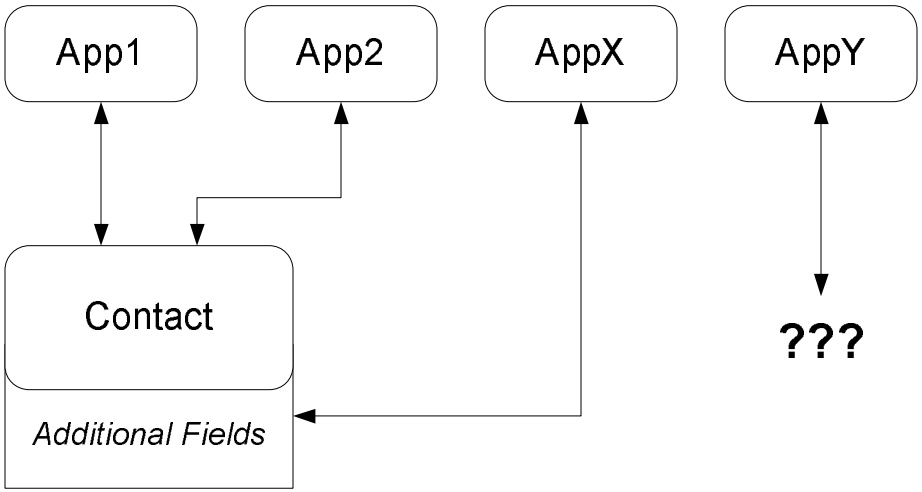


FIG. 37B

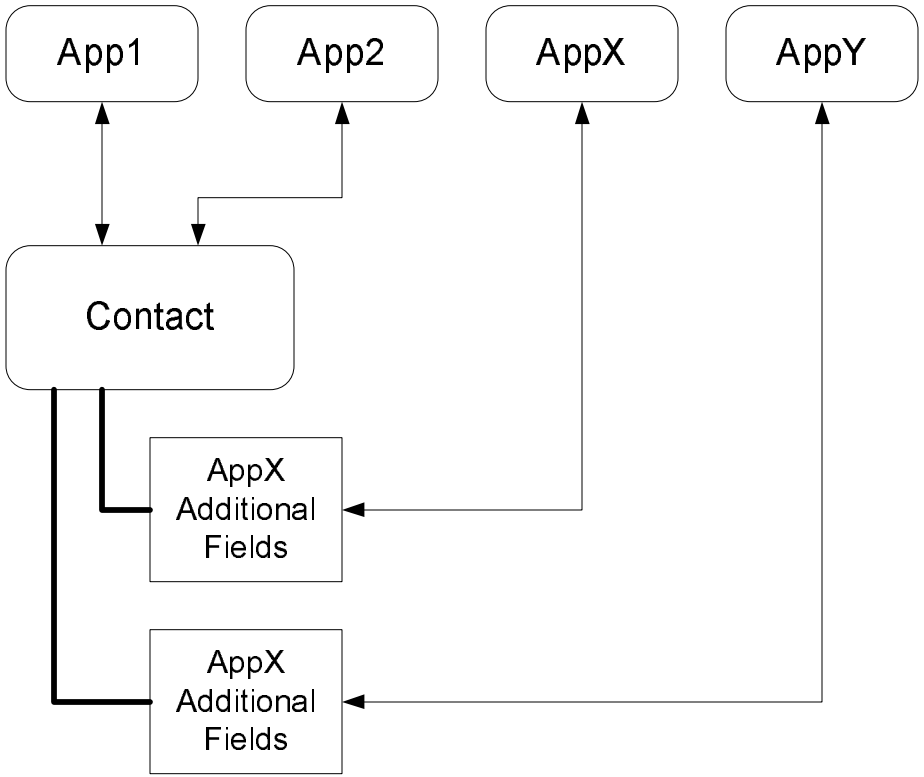

App1
App2
AppX
AppY
Contact
AppX Additional Fields
AppX Additional Fields

FIG. 37C