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(54) **FOOD TRACING AND TRACKING SYSTEM AND METHOD**

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(21) Appl. No.: **14/180,123**

(22) Filed: **Feb. 13, 2014**

Related U.S. Application Data

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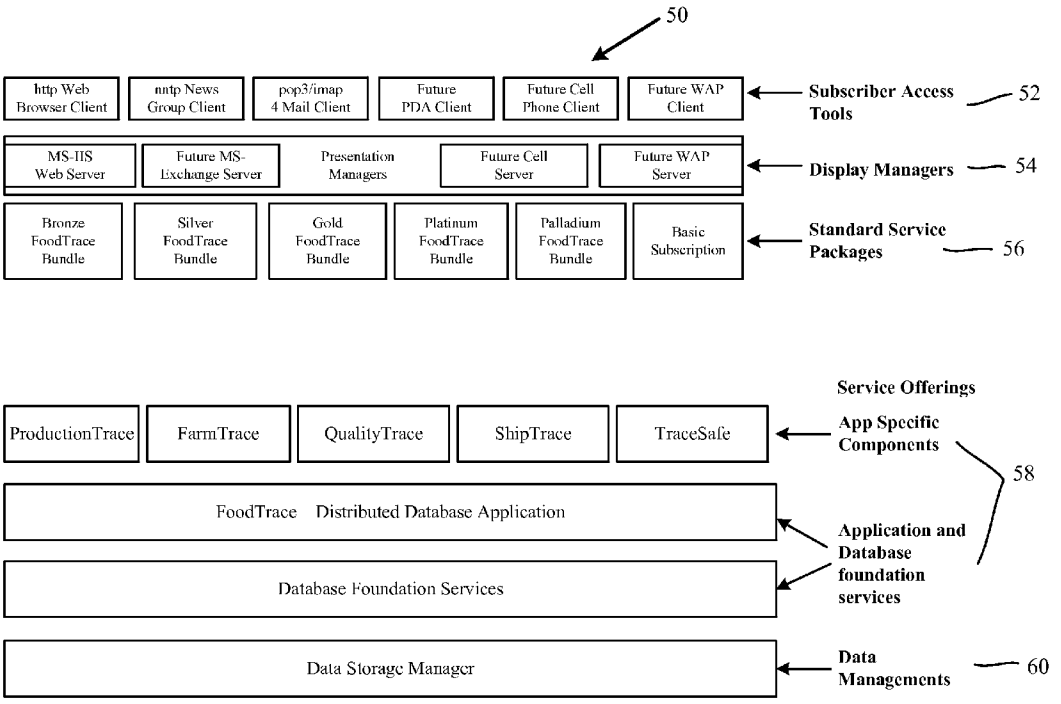
G06Q 10/08 (2006.01)

(52) **U.S. Cl.**
CPC ***G06Q 10/087*** (2013.01)
USPC **705/28**

(57) **ABSTRACT**

A food tracing and tracking system, method, and computer-program product are provided. The present invention allows companies that operate within these supply-chains, to exchange information bi-directionally throughout the entire supply-chain while maintaining data integrity and appropriate levels of security at all times and in real-time. The present invention enables a continuous linkage across the supply-chain-entities and changing of supply-chain entities in near real-time and ensures data integrity and data security, performs language translation, maintains a continuous history over time without the need for data conversion, and provides each entity within the supply chain the option of publishing their identity and data to the other supply chain entities. New fields can be added as needed for processes and materials. The present invention supports distributed data hosted on various machines by various organizations over a public or private data network.



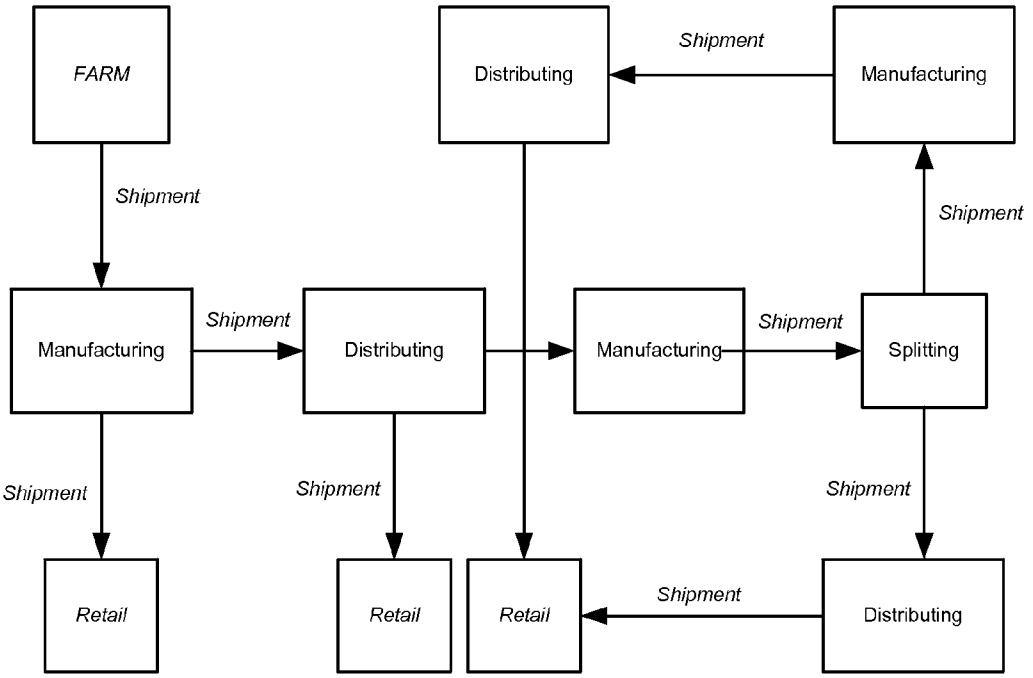


Fig. 1
(Prior Art)

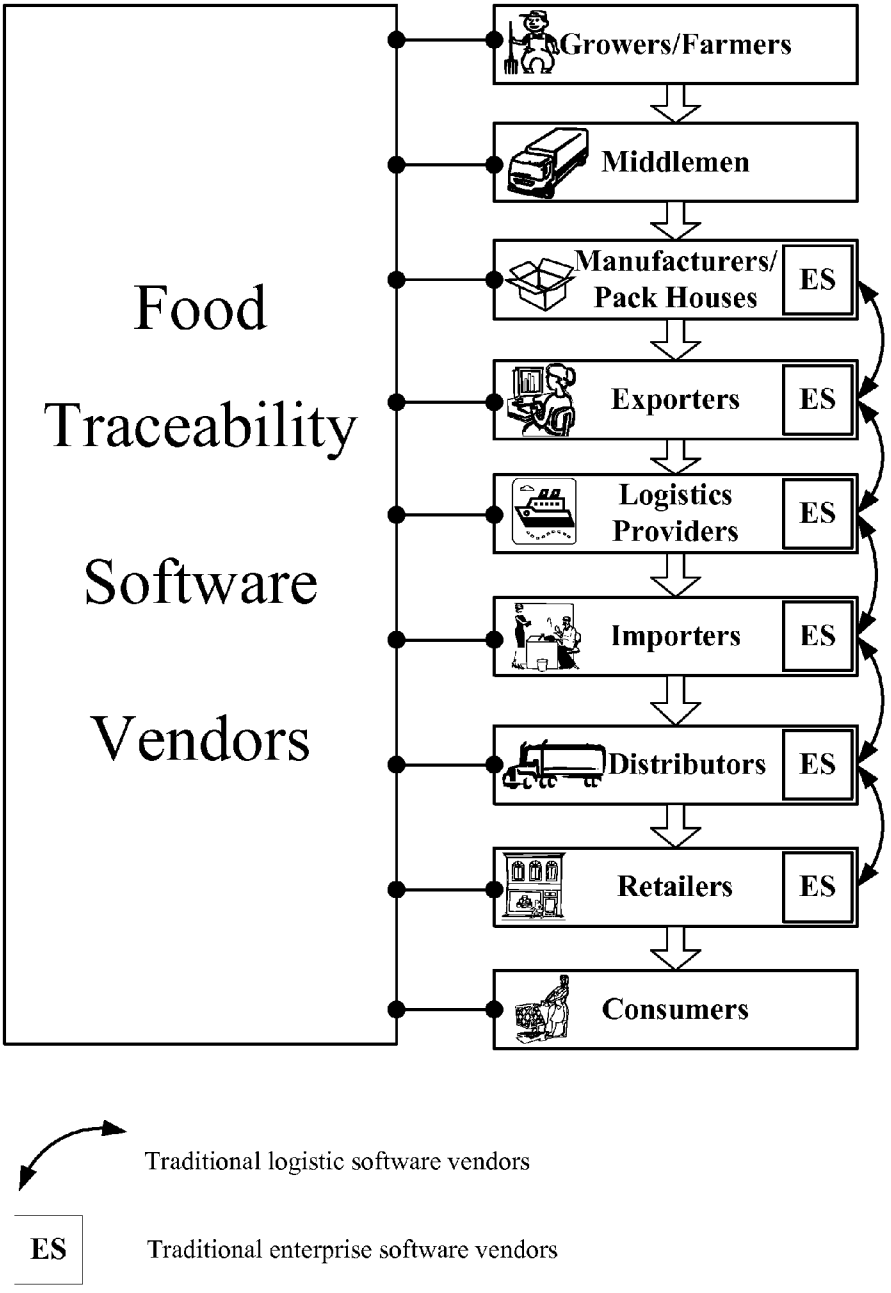


Fig. 2
(Prior Art)

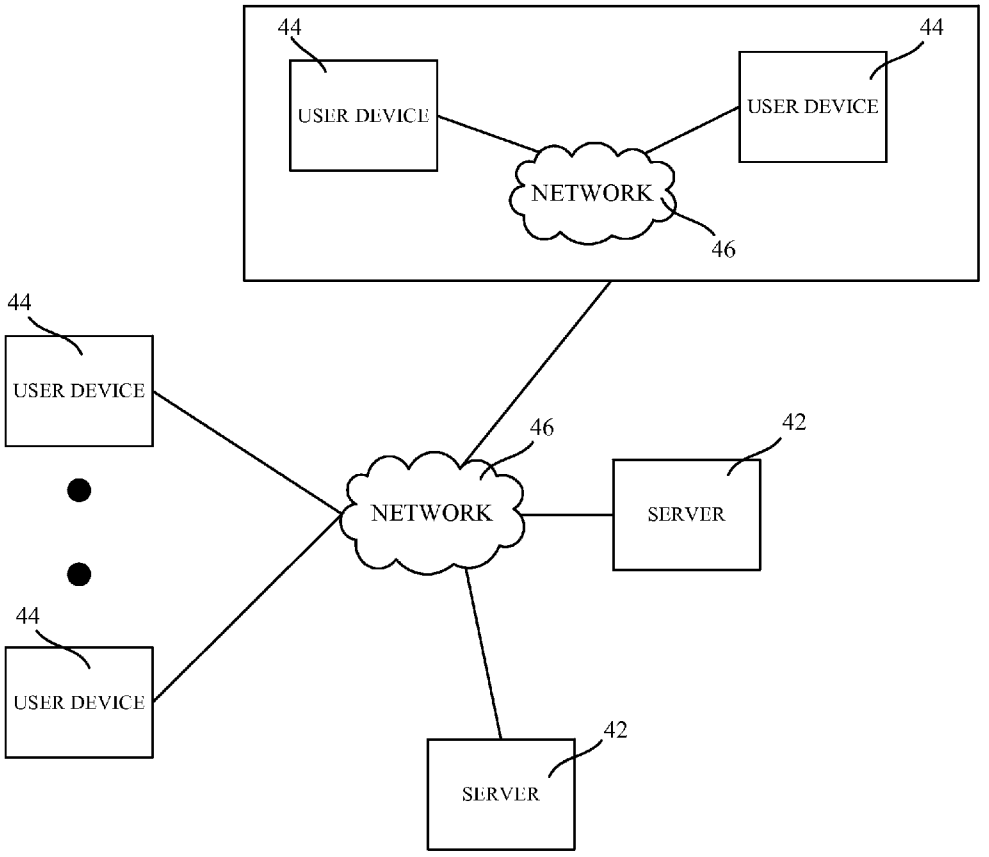

44
USER DEVICE
44
USER DEVICE
NETWORK
46
44
USER DEVICE
46
NETWORK
42
SERVER
44
USER DEVICE
42
SERVER

Fig. 3A

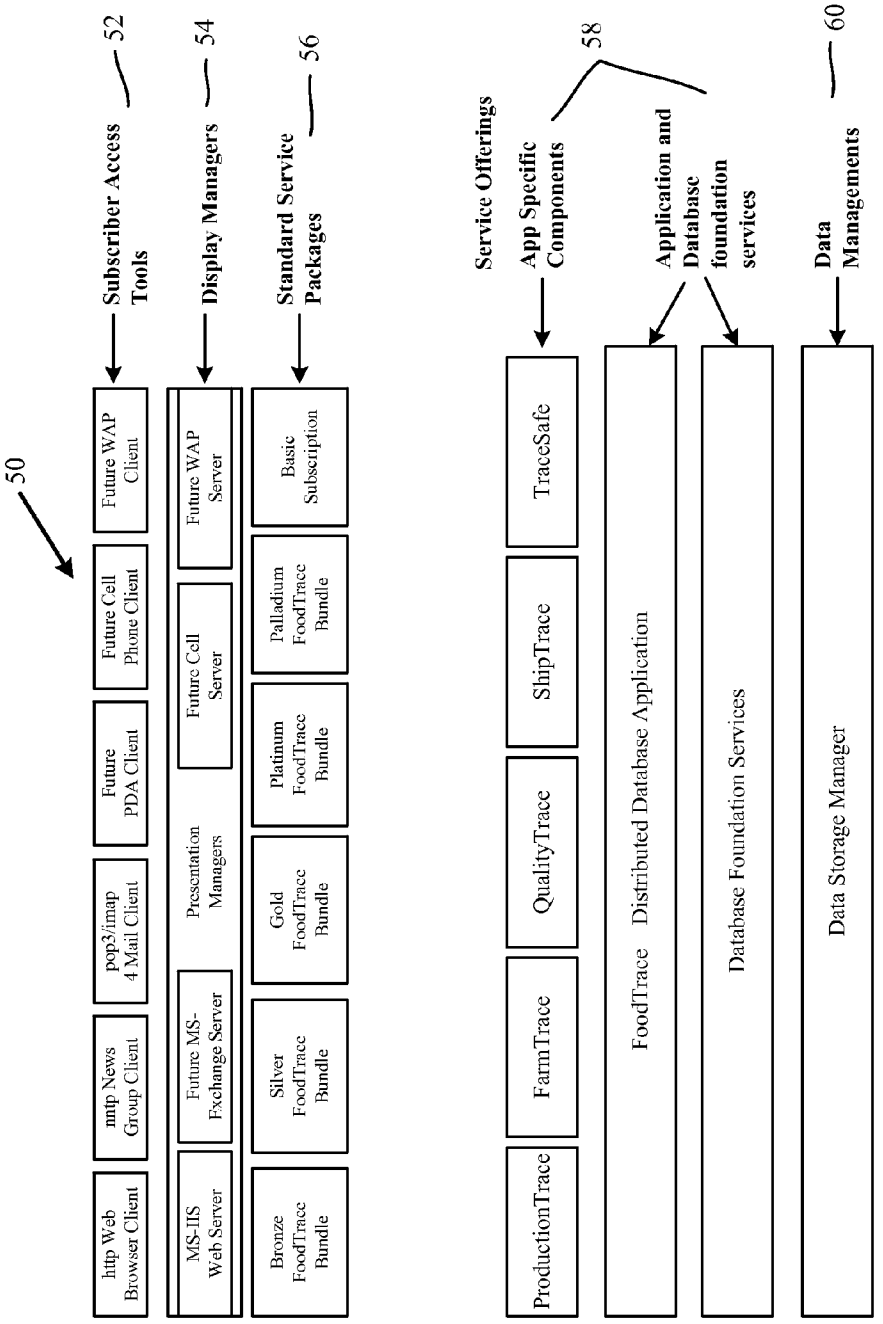

50
Subscriber Access Tools
52
Display Managers
54
Standard Service Packages
56
http Web Browser Client
nntp News Group Client
pop3/imap 4 Mail Client
Future PDA Client
Future Cell Phone Client
Future WAP Client
MS-IIS Web Server
Future MS-Exchange Server
Presentation Managers
Future Cell Server
Future WAP Server
Bronze FoodTrace Bundle
Silver FoodTrace Bundle
Gold FoodTrace Bundle
Platinum FoodTrace Bundle
Palladium FoodTrace Bundle
Basic Subscription
Service Offerings
App Specific Components
58
Application and Database foundation services
Data Managements
60
ProductionTrace
FarmTrace
QualityTrace
ShipTrace
TraceSafe
FoodTrace Distributed Database Application
Database Foundation Services
Data Storage Manager

Fig. 3B

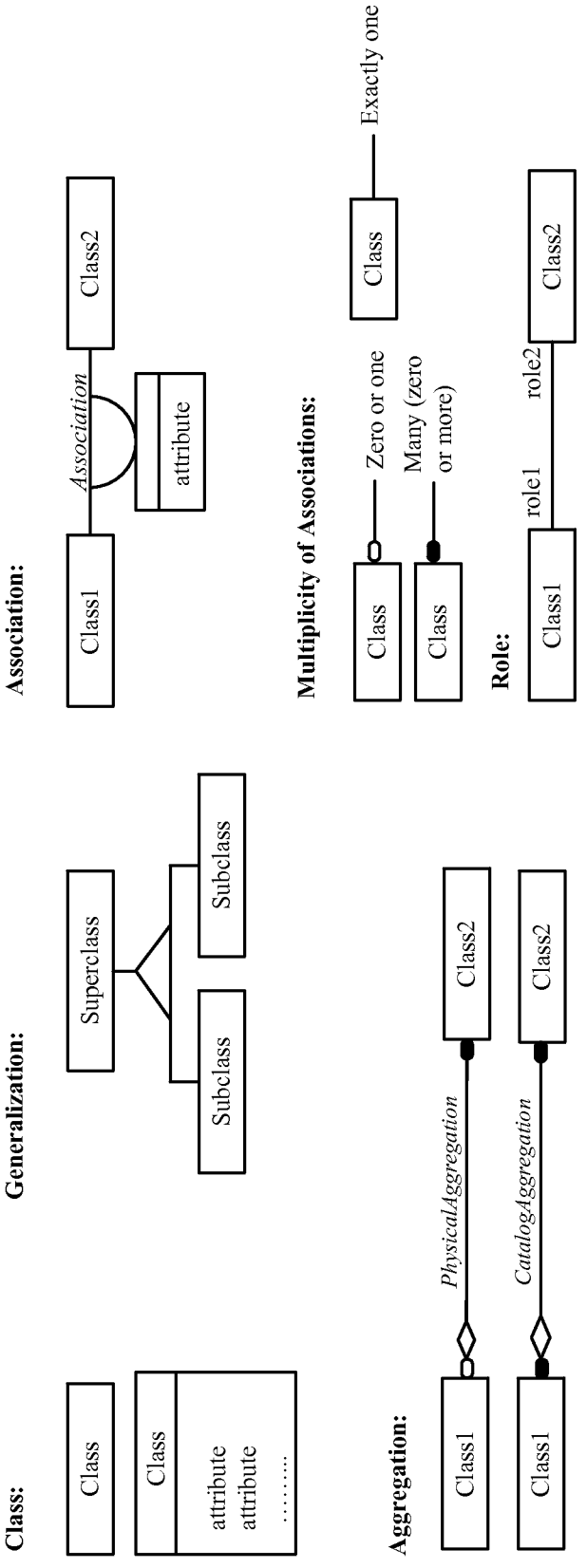

Class:
Class
Class
attribute
attribute
.....
Generalization:
Superclass
Subclass
Subclass
Association:
Class1
Association
Class2
attribute
Multiplicity of Associations:
Class
Zero or one
Class
Many (zero or more)
Class
Exactly one
Role:
Class1
role1
role2
Class2
Aggregation:
Class1
PhysicalAggregation
Class2
Class1
CatalogAggregation
Class2

Fig. 4

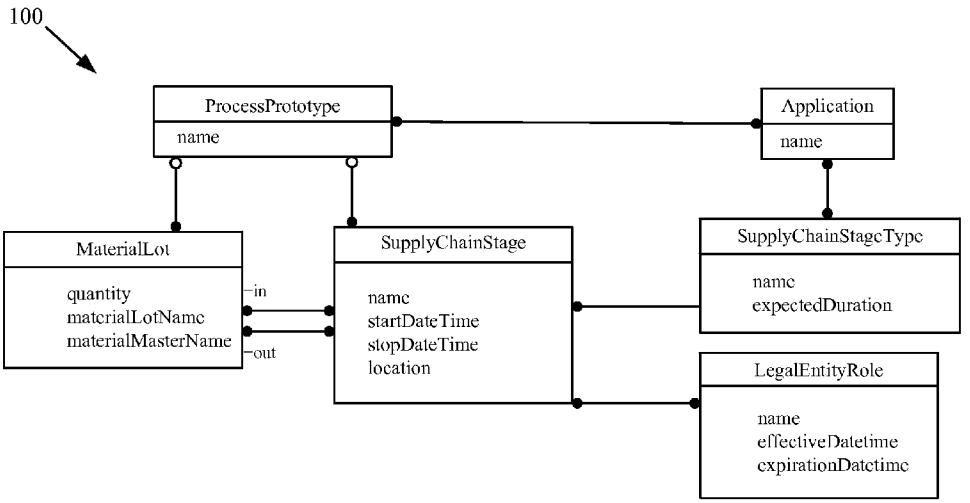

100
ProcessPrototype
name
Application
name
MaterialLot
quantity
materialLotName
materialMasterName
in
out
SupplyChainStage
name
startDateTime
stopDateTime
location
SupplyChainStageType
name
expectedDuration
LegalEntityRole
name
effectiveDatetime
expirationDatetime

Fig. 5A

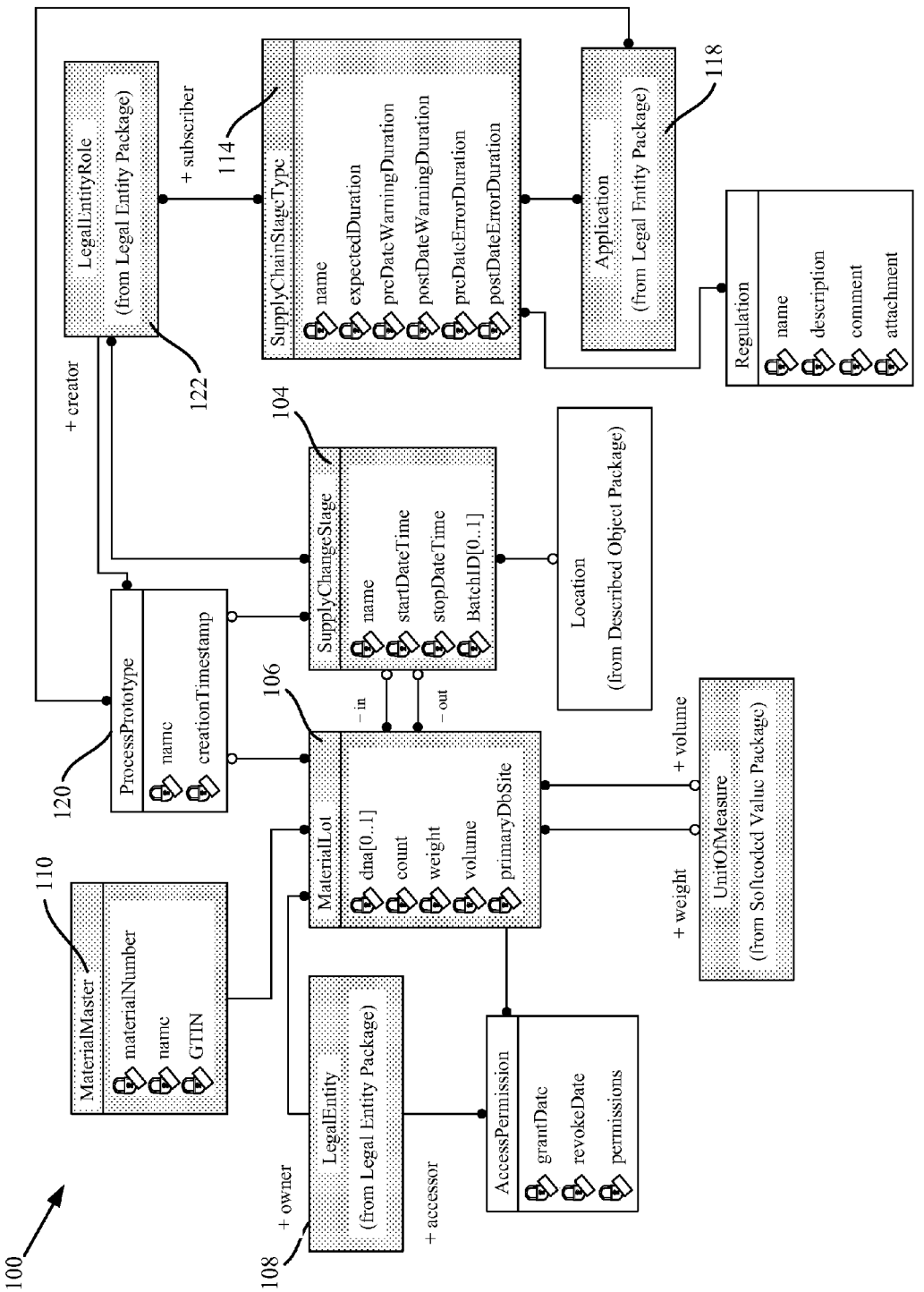

100
110
MaterialMaster
materialNumber
name
GTIN
120
ProcessPrototype
name
creationTimestamp
+ creator
LegalEntityRole
(from Legal Entity Package)
122
+ subscriber
114
SupplyChainStageType
name
expectedDuration
preDateWarningDuration
postDateWarningDuration
preDateErrorDuration
postDateErrorDuration
Application
(from Legal Entity Package)
118
Regulation
name
description
comment
attachment
104
SupplyChangeStage
name
startDateTime
stopDateTime
BatchID[0..1]
Location
(from Described Object Package)
106
MaterialLot
dna[0..1]
count
weight
volume
primaryDbSite
– in
– out
+ volume
+ weight
UnitOfMeasure
(from Socodcd Valuc Package)
108
+ owner
LegalEntity
(from Legal Entity Package)
+ accessor
AccessPermission
grantDate
revokeDate
permissions

Fig. 5B

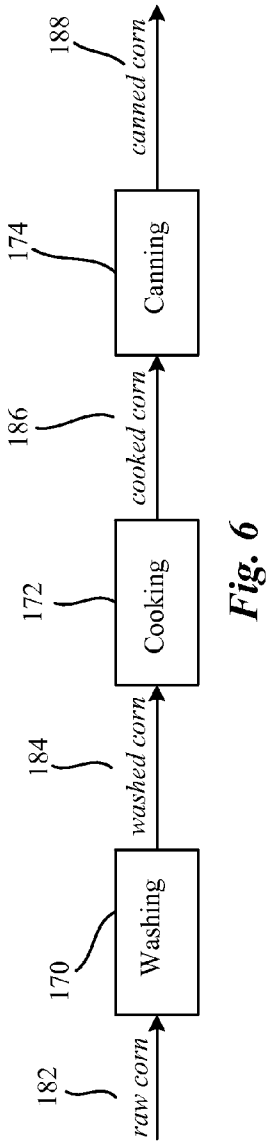

182
raw corn
170
Washing
184
washed corn
172
Cooking
186
cooked corn
174
Canning
188
canned corn

Fig. 6

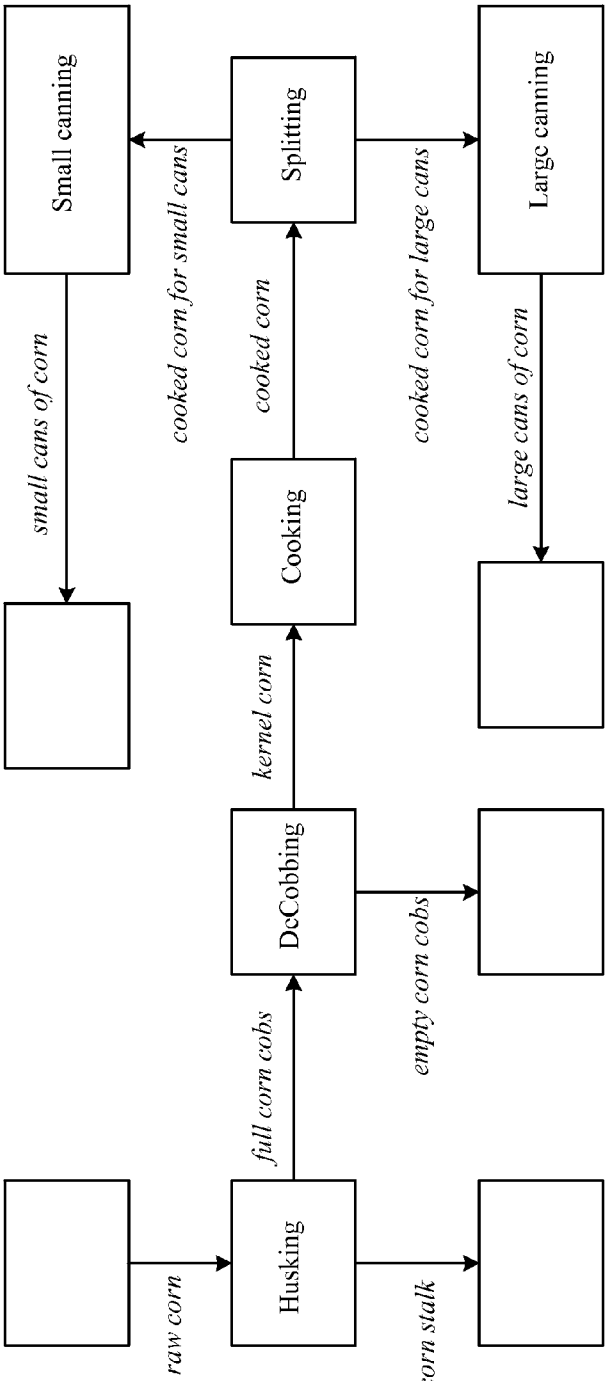

raw corn
Husking
full corn cobs
DeCobbing
kernel corn
Cooking
cooked corn
Splitting
small cans of corn
Small canning
cooked corn for small cans
corn stalk
empty corn cobs
cooked corn for large cans
large cans of corn
Large canning

Fig. 7

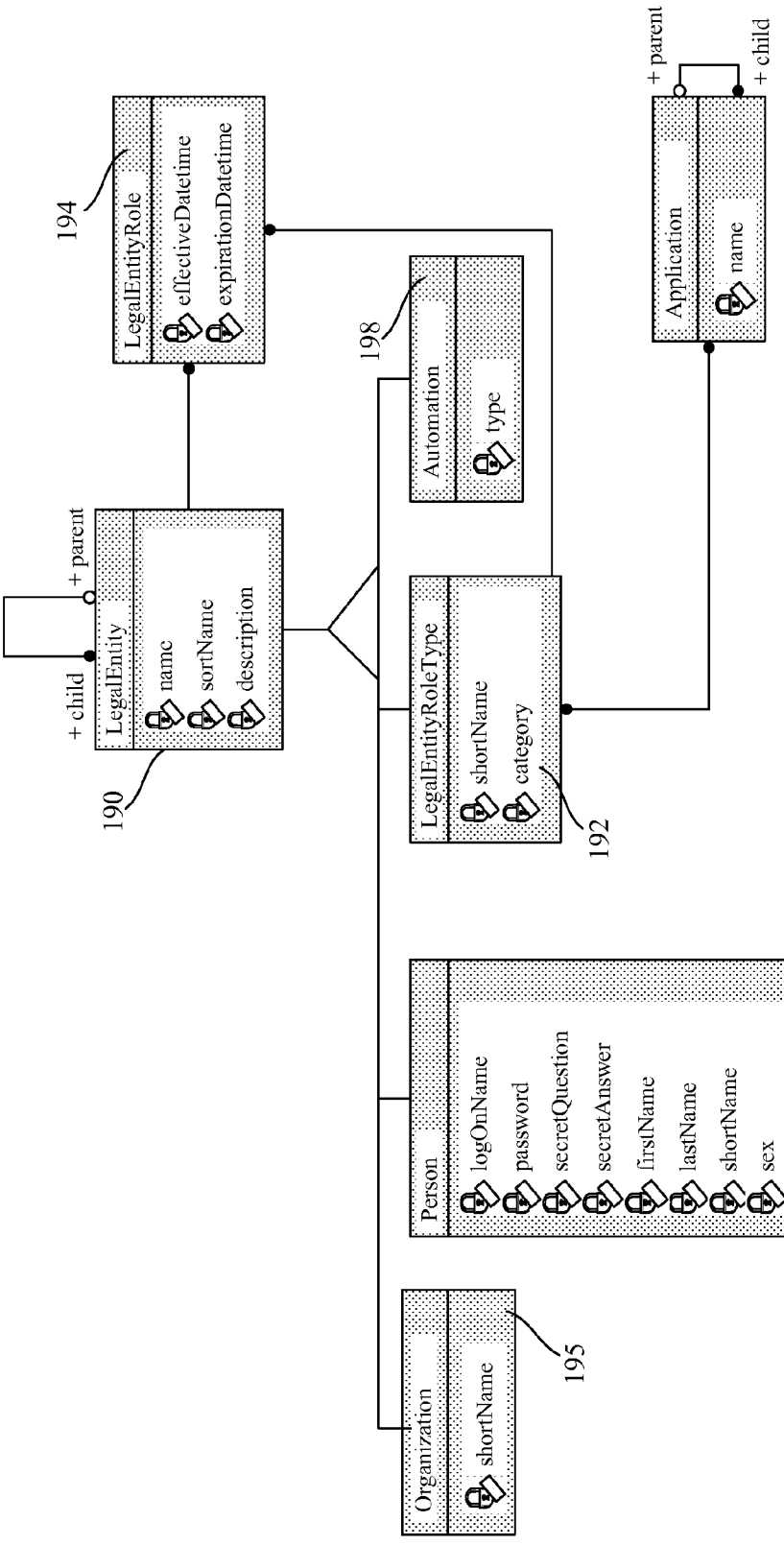

LegalEntity
name
sortName
description
+ parent
+ child
190
LegalEntityRole
effectiveDatetime
expirationDatetime
194
LegalEntityRoleType
shortName
category
192
Automation
type
198
Application
name
+ parent
+ child
Person
logOnName
password
secretQuestion
secretAnswer
firstName
lastName
shortName
sex
196
Organization
shortName
195

Fig. 8

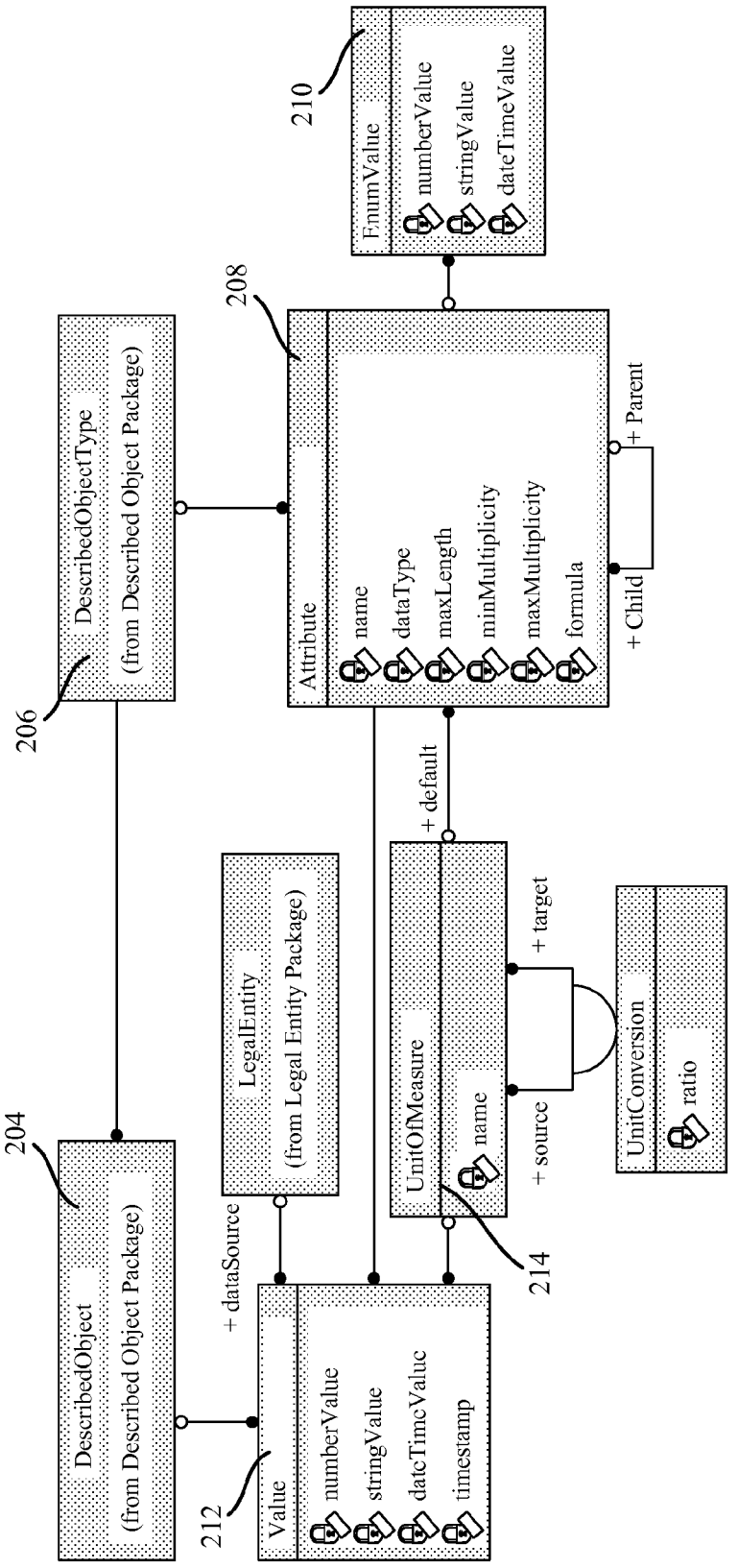

DescribedObject
(from Described Object Package)
204
DescribedObjectType
(from Described Object Package)
206
Value
numberValue
stringValue
dateTimeValue
timestamp
212
Attribute
name
dataType
maxLength
minMultiplicity
maxMultiplicity
formula
208
EnumValue
numberValue
stringValue
dateTimeValue
210
LegalEntity
(from Legal Entity Package)
UnitOfMeasure
name
214
UnitConversion
ratio
+ dataSource
+ default
+ Parent
+ Child
+ target
+ source

Fig. 9

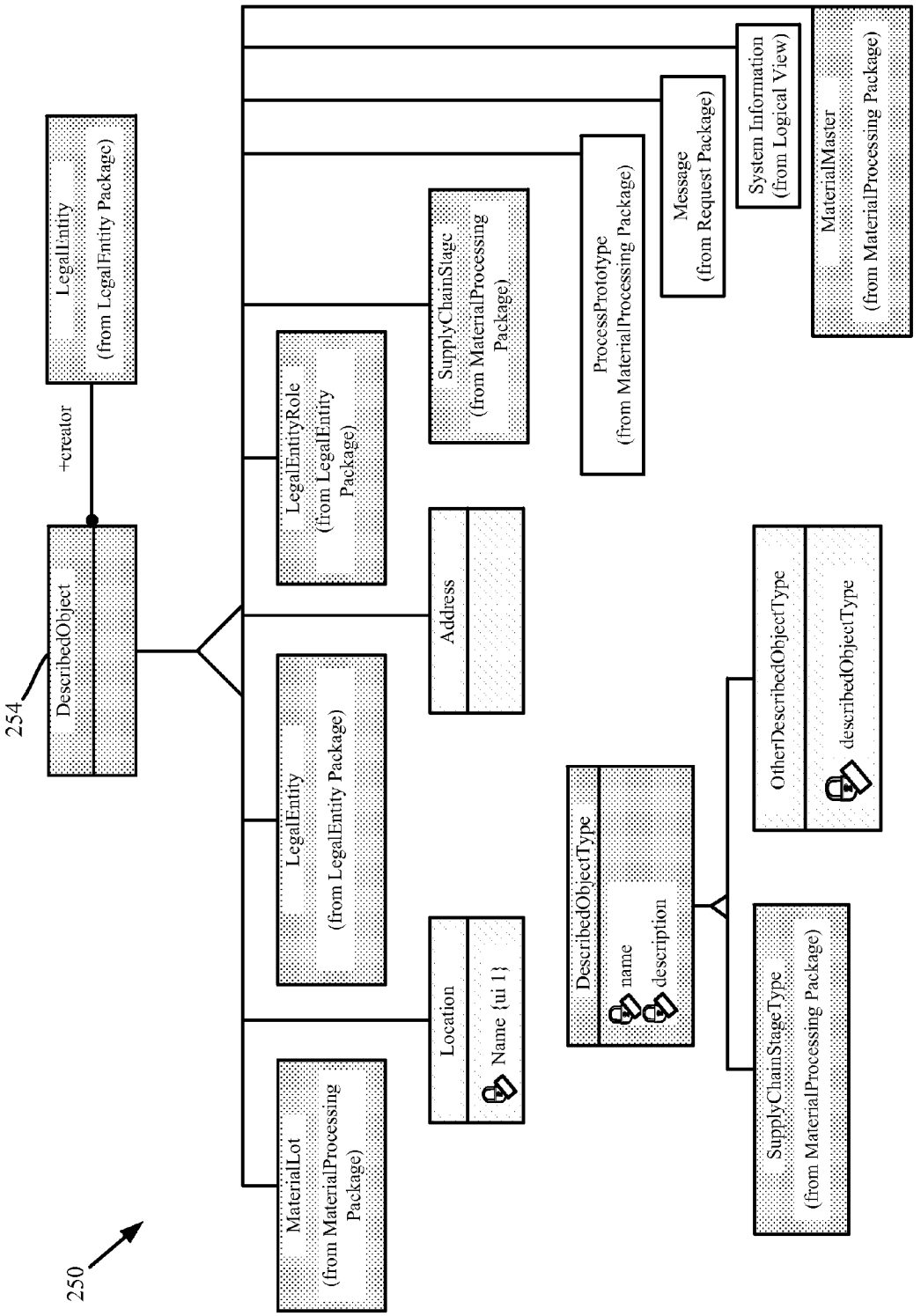

250
254
DescribedObject
+creator
LegalEntity
(from LegalEntity Package)
MaterialLot
(from MaterialProcessing Package)
LegalEntity
(from LegalEntity Package)
LegalEntityRole
(from LegalEntity Package)
Location
Name {ui 1}
Address
SupplyChainStage
(from MaterialProcessing Package)
ProcessPrototype
(from MaterialProcessing Package)
Message
(from Request Package)
System Information
(from Logical View)
MaterialMaster
(from MaterialProcessing Package)
DescribedObjectType
name
description
SupplyChainStageType
(from MaterialProcessing Package)
OtherDescribedObjectType
describedObjectType

Fig. 10

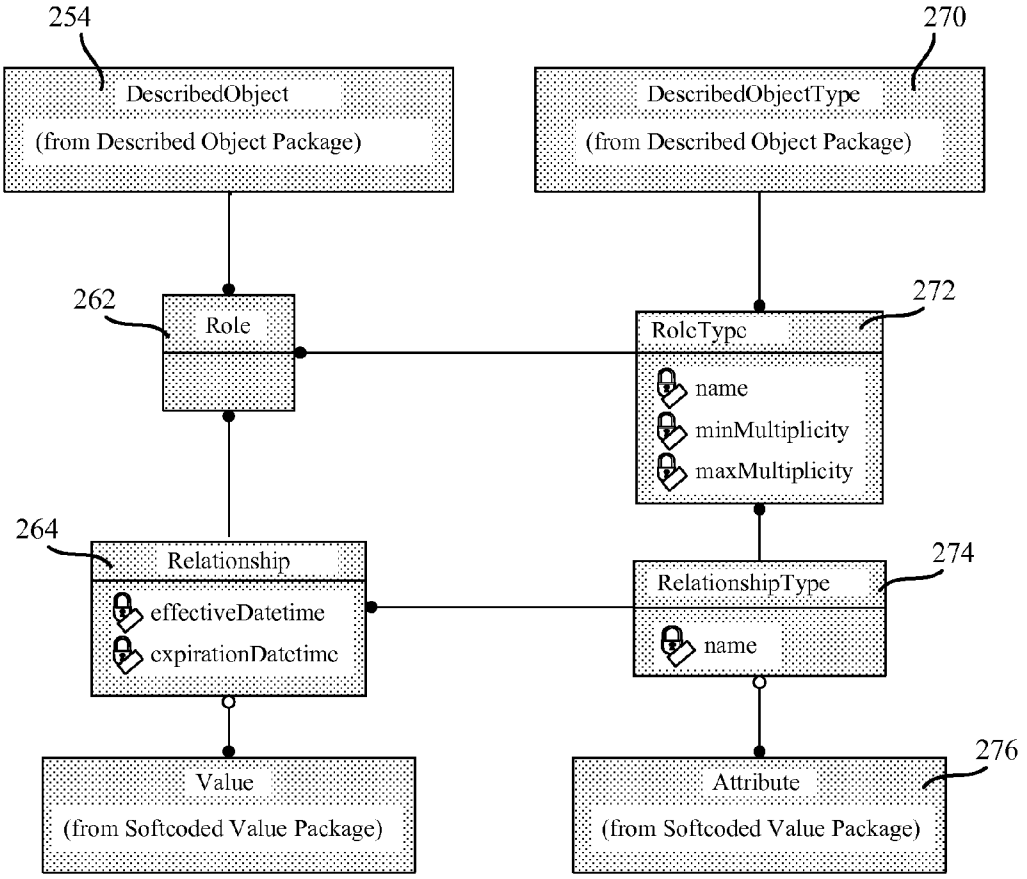

254
DescribedObject
(from Described Object Package)
270
DescribedObjectType
(from Described Object Package)
262
Role
272
RoleType
name
minMultiplicity
maxMultiplicity
264
Relationship
effectiveDatetime
expirationDatetime
274
RelationshipType
name
276
Value
(from Softcoded Value Package)
Attribute
(from Softcoded Value Package)

Fig. 11

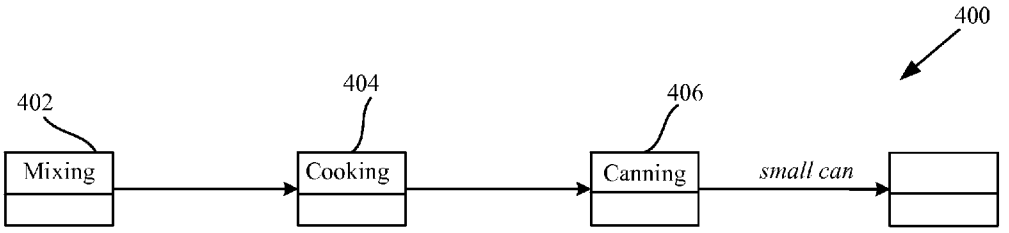

400
402
404
406
Mixing
Cooking
Canning
small can

Fig. 12

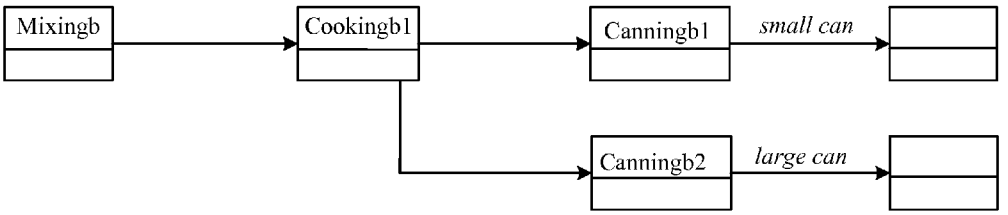

Mixingb
Cookingb1
Canningb1
small can
Canningb2
large can

Fig. 13

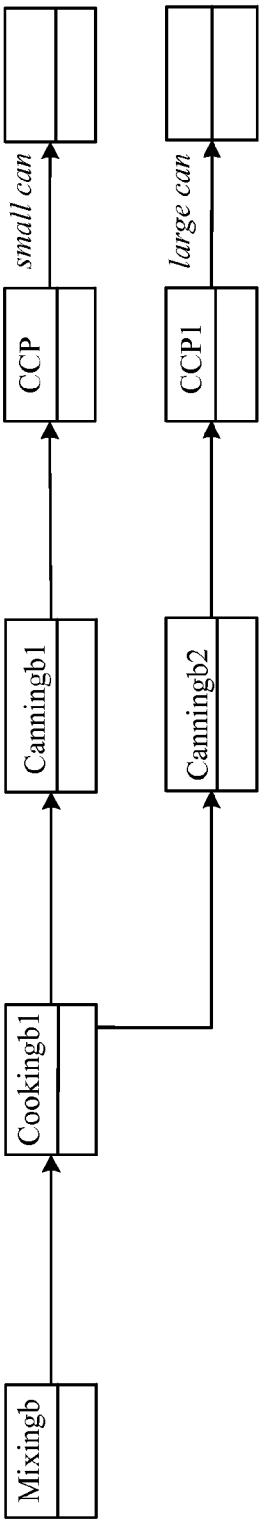

Mixingb
Cookingb1
Canningb1
Canningb2
CCP
CCP1
small can
large can

Fig. 14

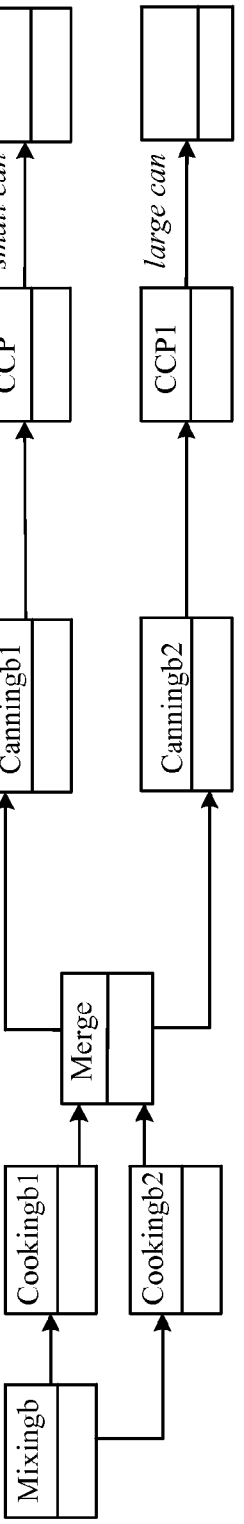

Mixingb
Cookingb1
Cookingb2
Merge
Canningb1
Canningb2
CCP
CCP1
small can
large can

Fig. 15

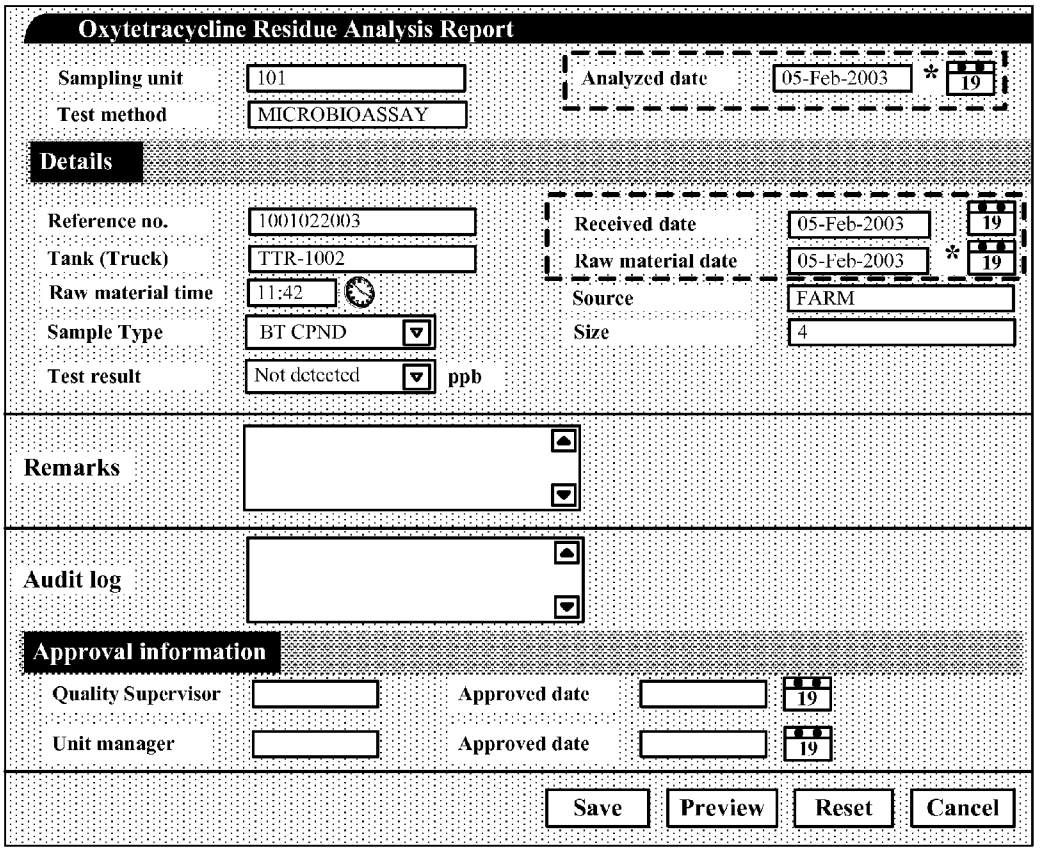

Oxytetracycline Residue Analysis Report
Sampling unit
101
Test method
MICROBIOASSAY
Analyzed date
05-Feb-2003
Details
Reference no.
1001022003
Tank (Truck)
TTR-1002
Raw material time
11:42
Sample Type
BT CPND
Test result
Not detected
ppb
Received date
05-Feb-2003
Raw material date
05-Feb-2003
Source
FARM
Size
4
Remarks
Audit log
Approval information
Quality Supervisor
Approved date
Unit manager
Approved date
Save
Preview
Reset
Cancel

Fig. 16

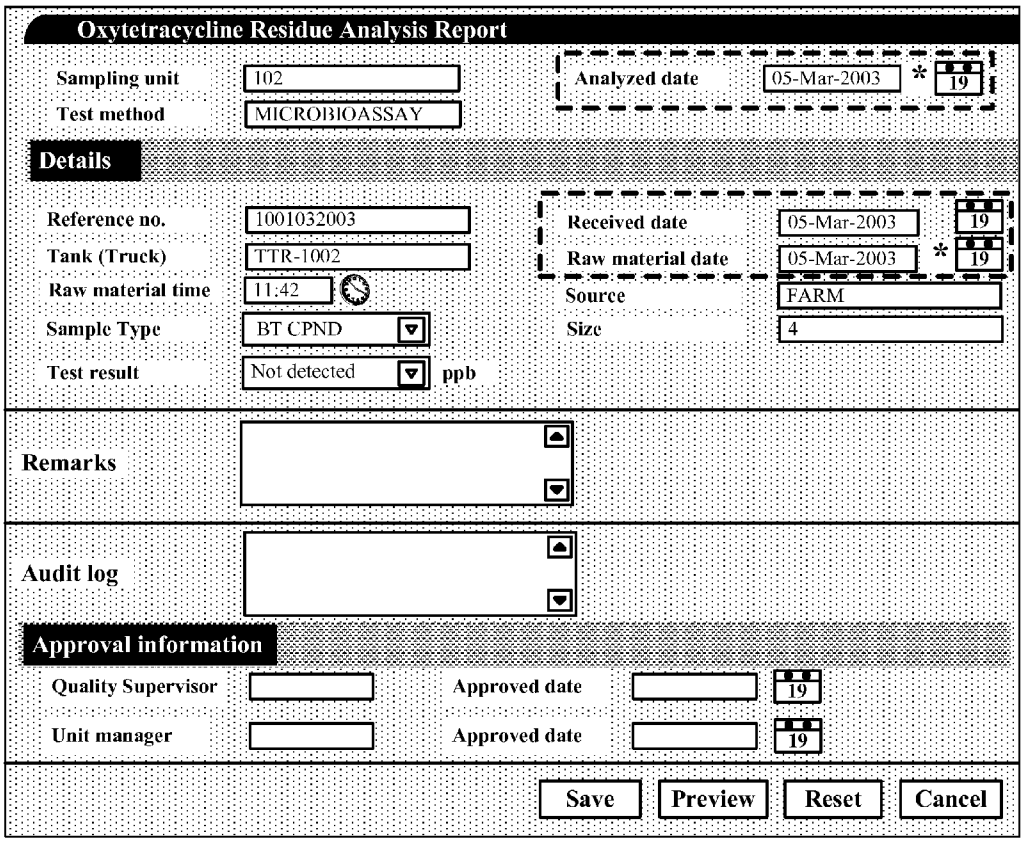

Oxytetracycline Residue Analysis Report
Sampling unit
102
Test method
MICROBIOASSAY
Analyzed date
05-Mar-2003
Details
Reference no.
1001032003
Tank (Truck)
TTR-1002
Raw material time
11:42
Sample Type
BT CPND
Test result
Not detected
ppb
Received date
05-Mar-2003
Raw material date
05-Mar-2003
Source
FARM
Size
4
Remarks
Audit log
Approval information
Quality Supervisor
Approved date
Unit manager
Approved date
Save
Preview
Reset
Cancel

Fig. 17

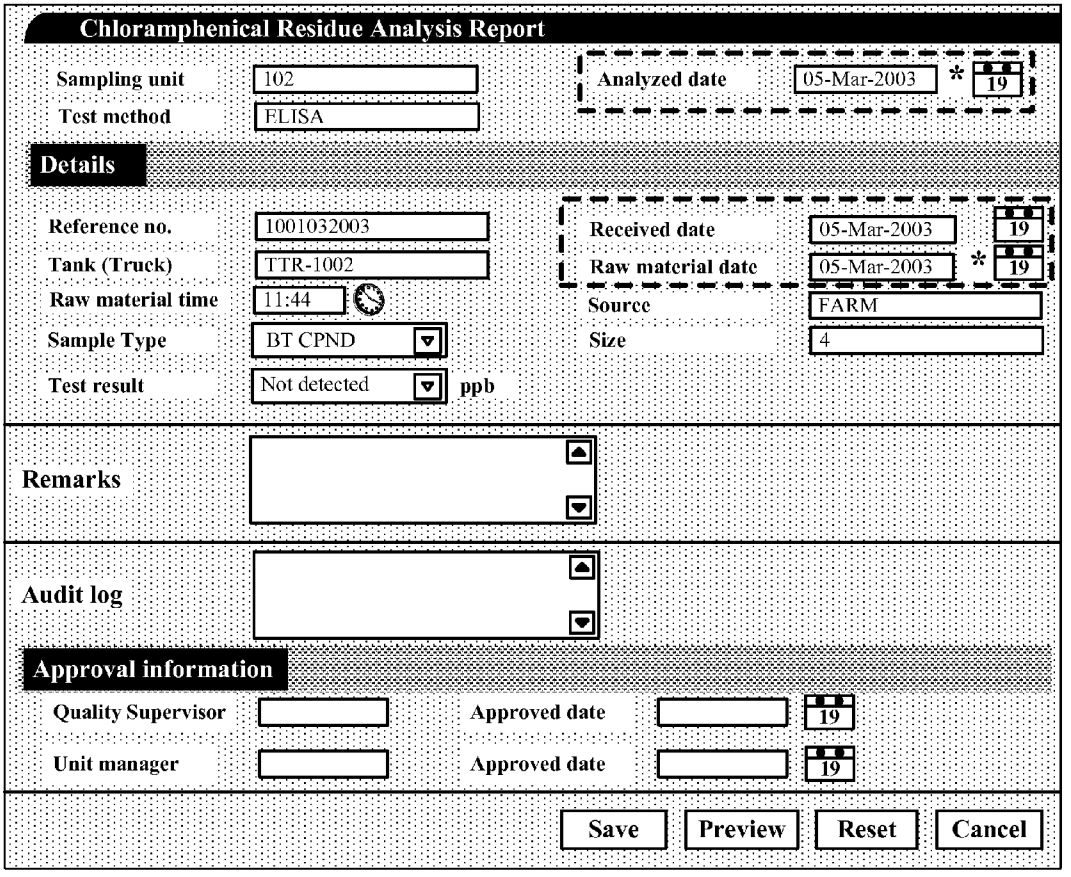

Chloramphenical Residue Analysis Report
Sampling unit
102
Test method
ELISA
Analyzed date
05-Mar-2003
Details
Reference no.
1001032003
Tank (Truck)
TTR-1002
Raw material time
11:44
Sample Type
BT CPND
Test result
Not detected
ppb
Received date
05-Mar-2003
Raw material date
05-Mar-2003
Source
FARM
Size
4
Remarks
Audit log
Approval information
Quality Supervisor
Approved date
Unit manager
Approved date
Save
Preview
Reset
Cancel

Fig. 18

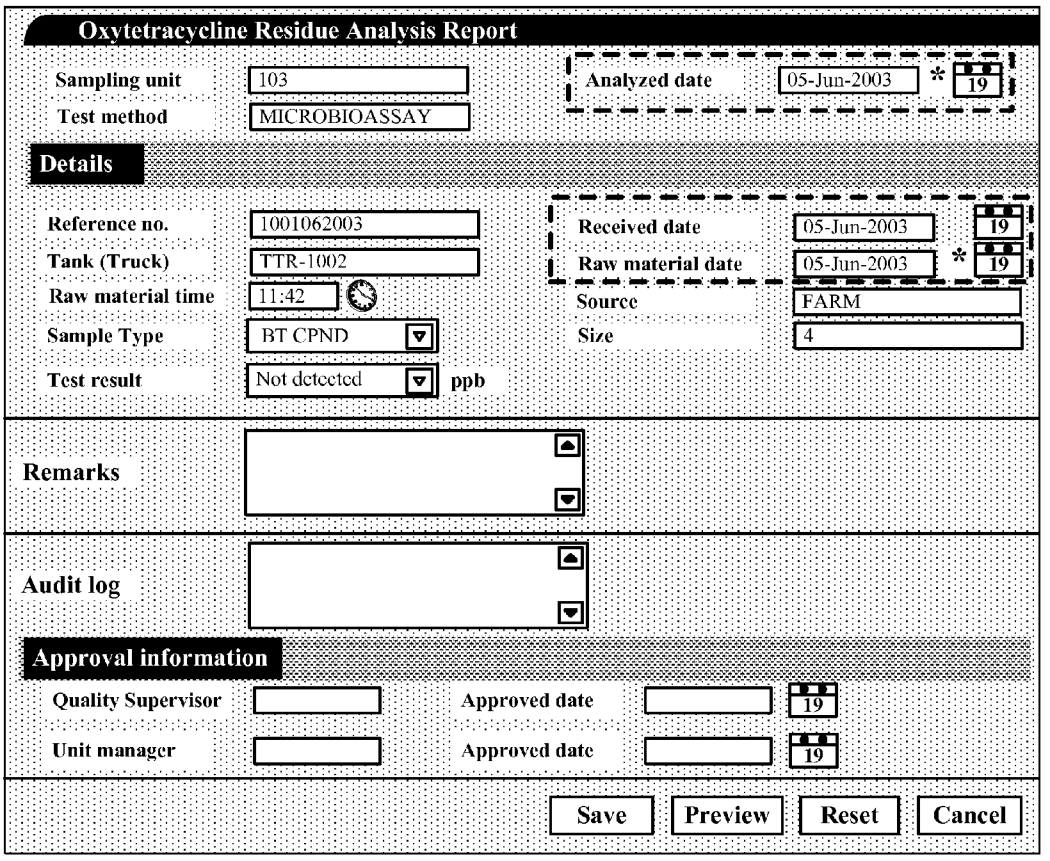

Oxytetracycline Residue Analysis Report
Sampling unit
103
Test method
MICROBIOASSAY
Analyzed date
05-Jun-2003
Details
Reference no.
1001062003
Tank (Truck)
TTR-1002
Raw material time
11:42
Sample Type
BT CPND
Test result
Not detected
ppb
Received date
05-Jun-2003
Raw material date
05-Jun-2003
Source
FARM
Size
4
Remarks
Audit log
Approval information
Quality Supervisor
Approved date
Unit manager
Approved date
Save
Preview
Reset
Cancel

Fig. 19

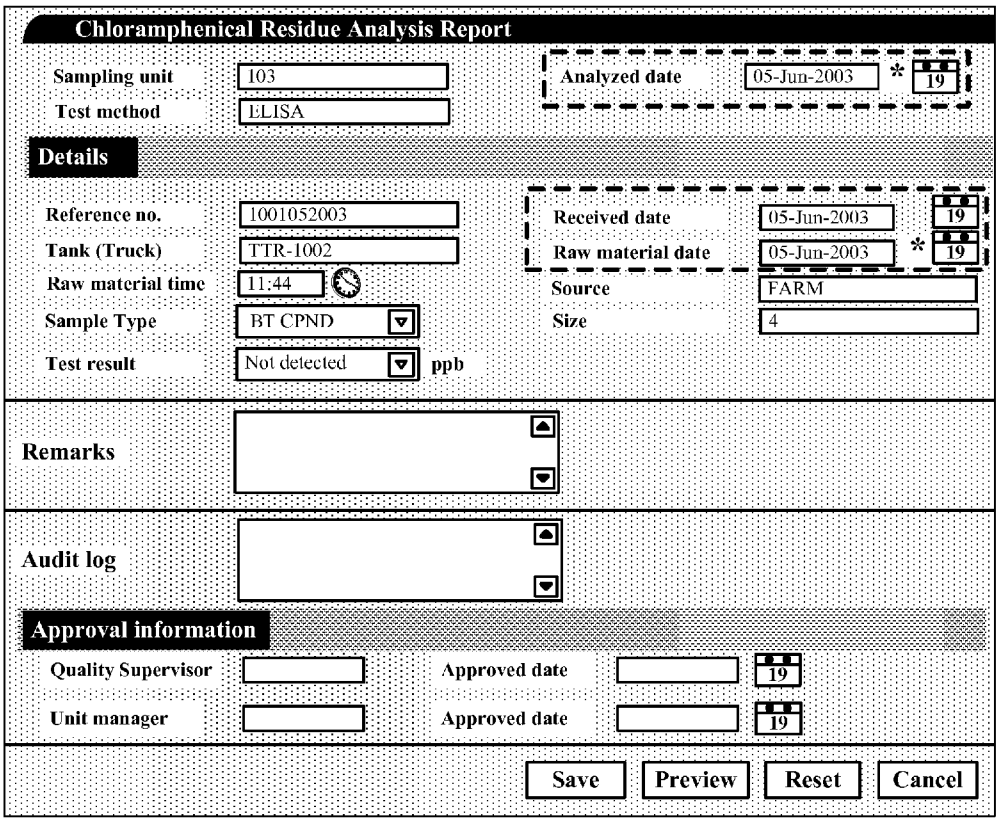

Chloramphenical Residue Analysis Report
Sampling unit
103
Test method
ELISA
Analyzed date
05-Jun-2003
Details
Reference no.
1001052003
Tank (Truck)
TTR-1002
Raw material time
11:44
Sample Type
BT CPND
Test result
Not detected
ppb
Received date
05-Jun-2003
Raw material date
05-Jun-2003
Source
FARM
Size
4
Remarks
Audit log
Approval information
Quality Supervisor
Approved date
Unit manager
Approved date
Save
Preview
Reset
Cancel

Fig. 20

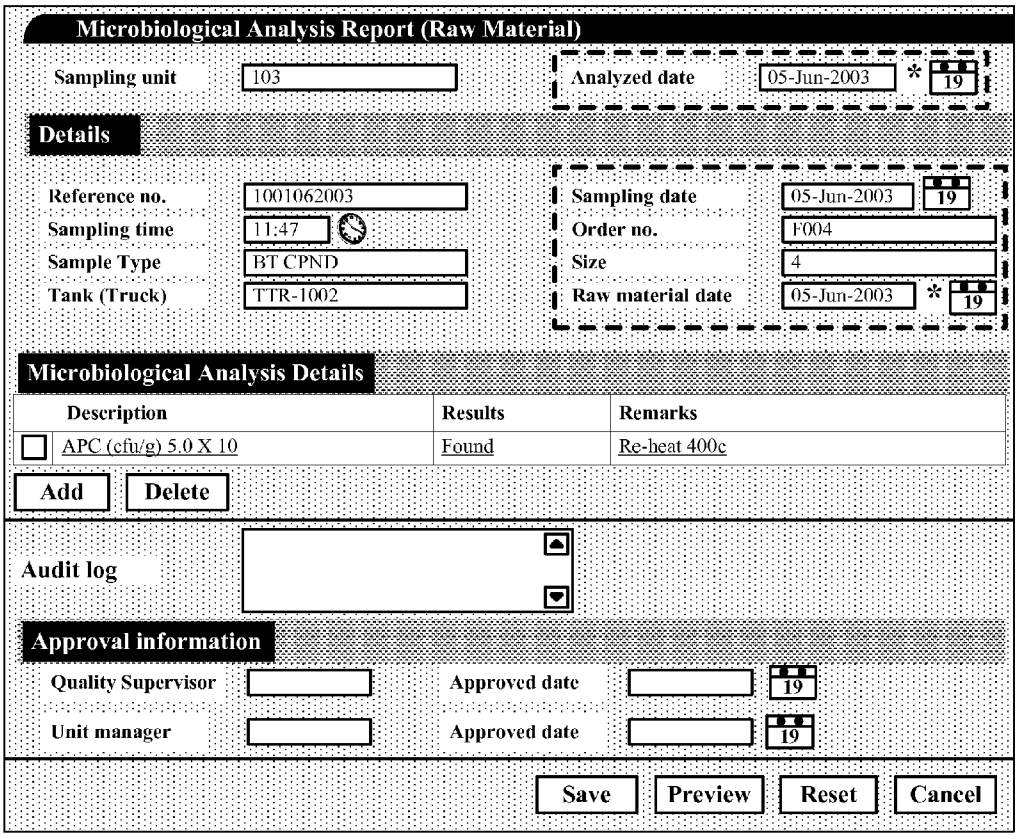

Microbiological Analysis Report (Raw Material)
Sampling unit
103
Analyzed date
05-Jun-2003
Details
Reference no.
1001062003
Sampling time
11:47
Sample Type
BT CPND
Tank (Truck)
TTR-1002
Sampling date
05-Jun-2003
Order no.
F004
Size
4
Raw material date
05-Jun-2003
Microbiological Analysis Details
Description
Results
Remarks
APC (cfu/g) 5.0 X 10
Found
Re-heat 400c
Add
Delete
Audit log
Approval information
Quality Supervisor
Approved date
Unit manager
Approved date
Save
Preview
Reset
Cancel

Fig. 21

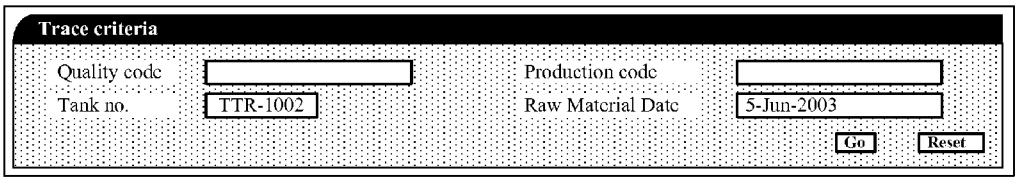

Trace criteria
Quality code
Tank no.
TTR-1002
Production code
Raw Material Date
5-Jun-2003
Go
Reset

Fig. 22

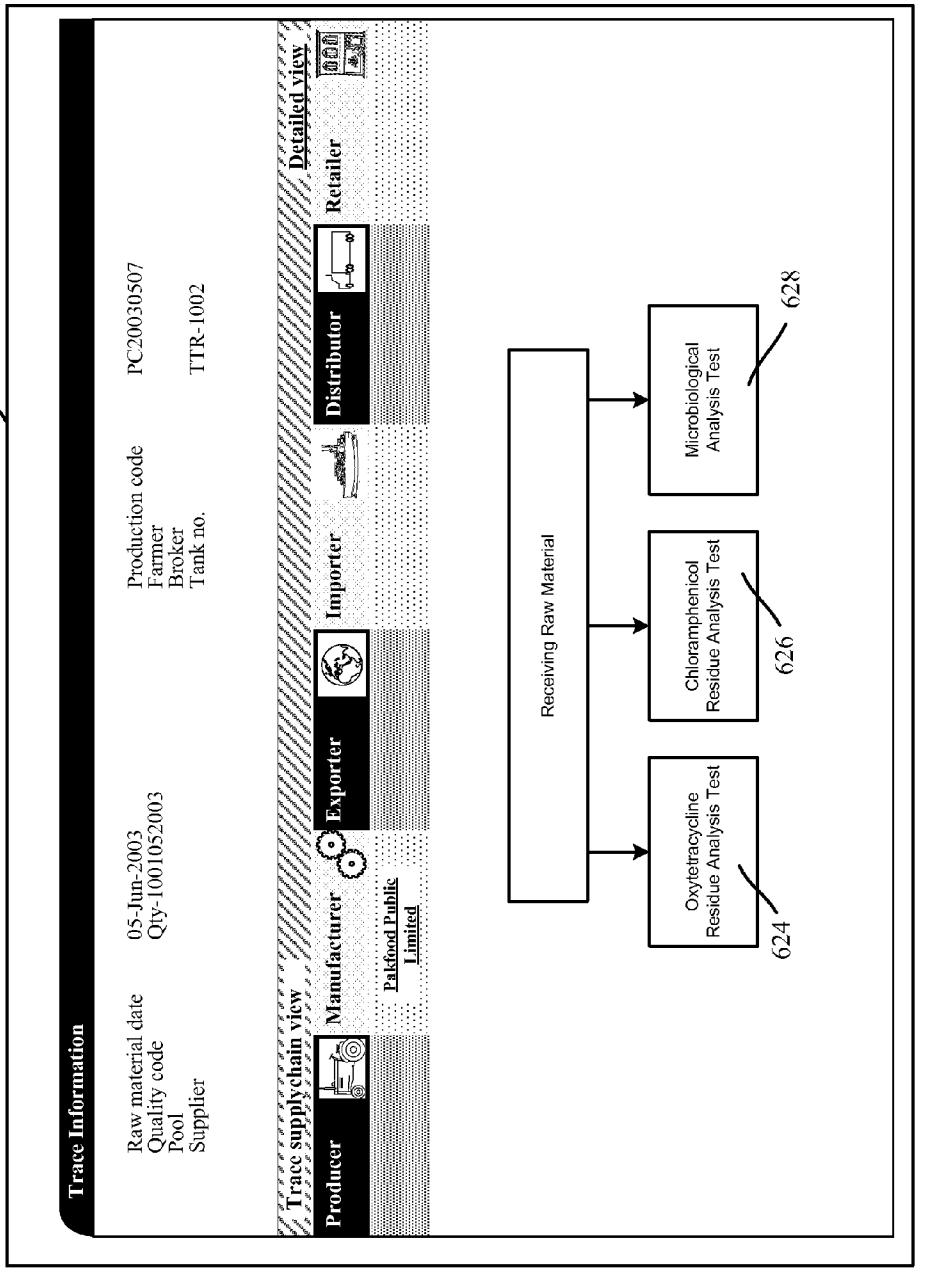

620
Trace Information
Raw material date
Quality code
Pool
Supplier
05-Jun-2003
Qty-1001052003
Production code
Farmer
Broker
Tank no.
PC20030507
TTR-1002
Trace supplychain view
Detailed view
Producer
Manufacturer
Exporter
Importer
Distributor
Retailer
Pakfood Public Limited
Receiving Raw Material
Oxytetracycline Residue Analysis Test
Chloramphenicol Residue Analysis Test
Microbiological Analysis Test
624
626
628

Fig. 23

Pakfood Public Company Limited
Oxytetracycline Residue Analysis Report

Sampling unit	103	**Analyzed date**	05-Jun-2003
Test method	MICROBIOASSAY		

Details

Reference no.	1001062003	**Received date**	05-Jun-2003
Tank (Truck)	TTR-1002	**Raw material date**	05-Jun-2003
Raw material time	11:42	**Source**	FARM
Sample Type	BT CPND	**Size**	4
Test result	Not detected ppb		

Remarks

Audit log

Approval information

Quality Supervisor	**Approved date**
Unit manager	**Approved date**

Fig. 24

Pakfood Public Company Limited
Chloramphenical Residue Analysis Report

Sampling unit	103	**Analyzed date**	05-Jun-2003
Test method	ELISA		

Details

Reference no.	1001062003	**Received date**	05-Jun-2003
Tank (Truck)	TTR-1002	**Raw material date**	05-Jun-2003
Raw material time	11:44	**Source**	FARM
Sample Type	BT CPND	**Size**	4
Test result	Not detected ppb		

Remarks

Audit log

Approval information

Quality Supervisor	**Approved date**
Unit manager	**Approved date**

Fig. 25

Pakfood Public Company Limited
Microbiological Analysis Report (Raw Material)

Sampling unit	103	**Analyzed date**	05-Jun-2003

Details

Reference no.	1001062003	**Sampling date**	05-Jun-2003
Sampling time	11:47	**Order no.**	T004
Sample Type	BT CPND	**Size**	5
Tank (Truck)	TTR-1002	**Raw material date**	05-Jun-2003

Microbiological Analysis Details

Description	Results	Results
APC (cfu/g) 5.0 X 10	Pass	Test remarks

Audit log

Approval information

Quality Supervisor	**Approved date**
Unit manager	**Approved date**

Fig. 26

Trace criteria

Quality code		Production code	
Tank no.	TTR-950	Raw Material Date	10-Mar-2003

Go Reset

Fig. 27

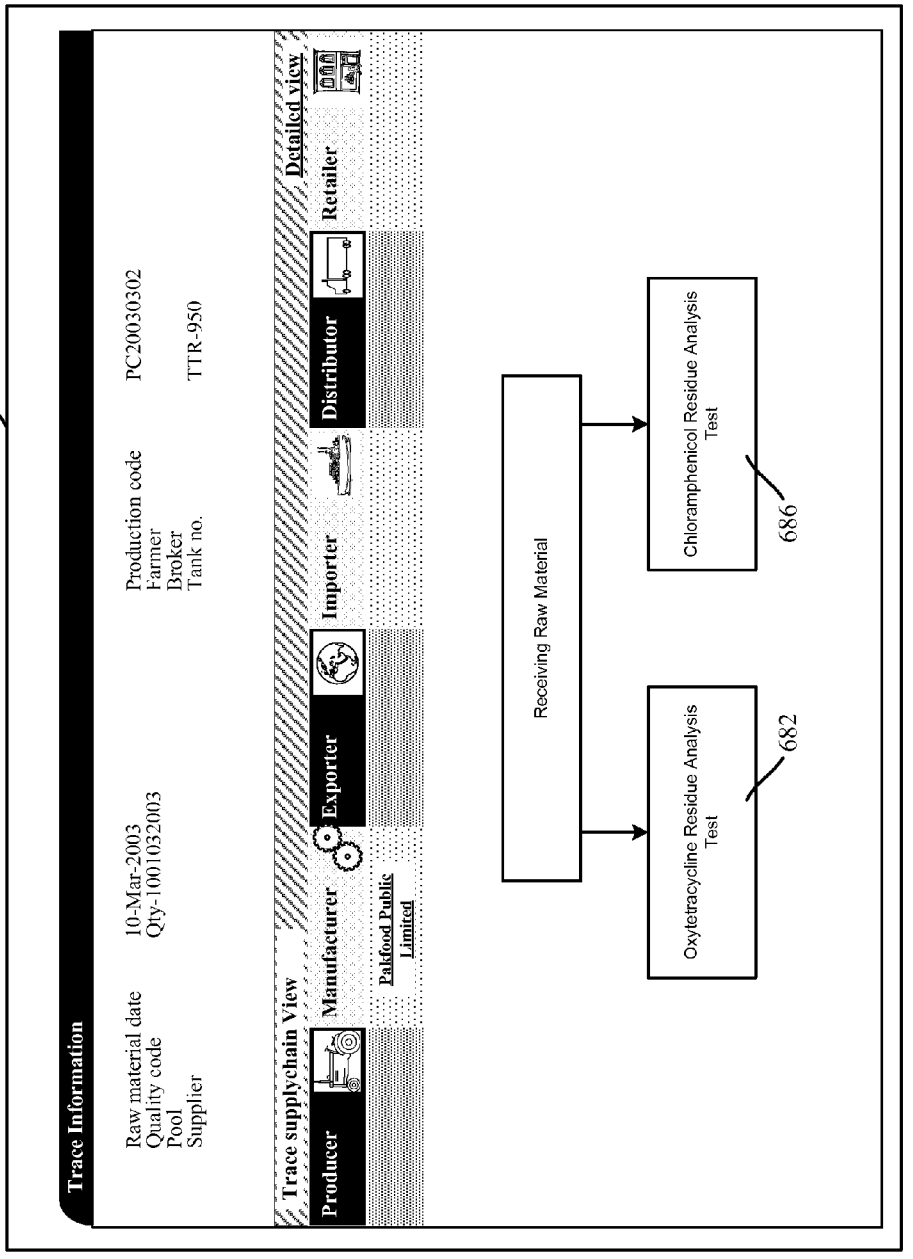

680
Trace Information
Raw material date
Quality code
Pool
Supplier
10-Mar-2003
Qty-10010320003
Production code
Farmer
Broker
Tank no.
PC20030302
TTR-950
Trace supplychain View
Detailed view
Producer
Manufacturer
Exporter
Importer
Distributor
Retailer
Pakfood Public Limited
Receiving Raw Material
Oxytetracycline Residue Analysis Test
682
Chloramphenicol Residue Analysis Test
686

Fig. 28

Pakfood Public Company Limited
Oxytetracycline Residue Analysis Report

Sampling unit	10	**Analyzed date**	10-Mar-2003
Test method	MICROBIOASSAY		

Details

Reference no.	1001032003	**Received date**	10-Mar-2003
Tank (Truck)	TTR-950	**Raw material date**	10-Mar-2003
Raw material time	11:42	**Source**	FARM
Sample Type	BT CPND	**Size**	4
Test result	Not detected ppb		

Remarks

Audit log

Approval information

Quality Supervisor	**Approved date**
Unit manager	**Approved date**

Fig. 29

Pakfood Public Company Limited
Chloramphenical Residue Analysis Report

Sampling unit	10	**Analyzed date**	10-Mar-2003
Test method	ELISA		

Details

Reference no.	1001032003	**Received date**	10-Mar-2003
Tank (Truck)	TTR-950	**Raw material date**	10-Mar-2003
Raw material time	11:44	**Source**	FARM
Sample Type	BT CPND	**Size**	4
Test result	Not detected ppb		

Remarks

Audit log

Approval information

Quality Supervisor	**Approved date**
Unit manager	**Approved date**

Fig. 30

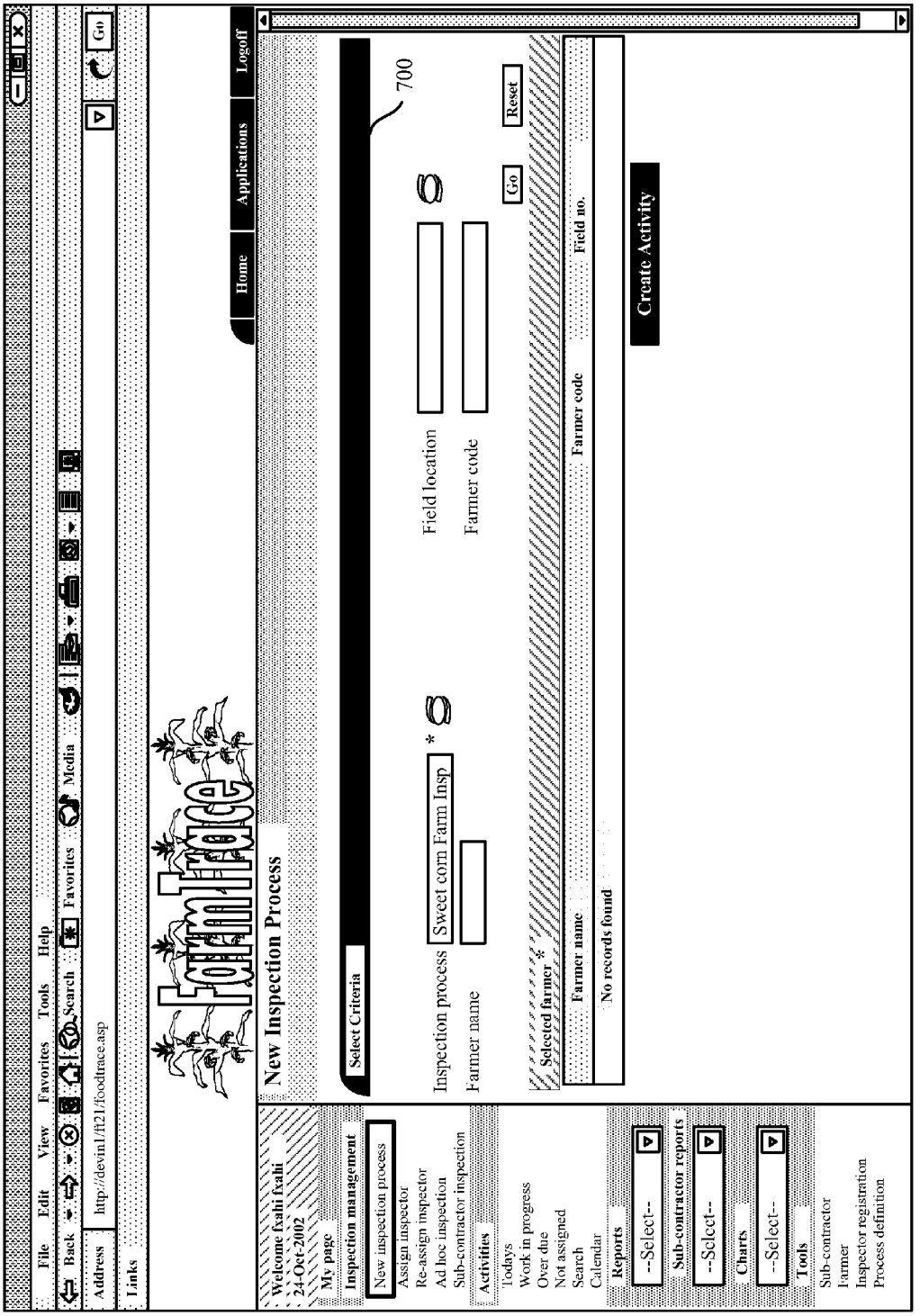

File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://devinl/ft21/foodtrace.asp
Go
Links
FoodTrace
Home
Applications
Logoff
Welcome Ixahi Ixahi
24-Oct-2002
My page
Inspection management
New inspection process
Assign inspector
Re-assign inspector
Ad hoc inspection
Sub-contractor inspection
Activities
Todays
Work in progress
Over due
Not assigned
Search
Calendar
Reports
--Select--
Sub-contractor reports
--Select--
Charts
--Select--
Tools
Sub-contractor
Farmer
Inspector registration
Process definition
New Inspection Process
Select Criteria
700
Inspection process
Sweet corn Farm Insp
Farmer name
Field location
Farmer code
Go
Reset
Selected farmer *
Farmer name
Farmer code
Field no.
No records found
Create Activity

Fig. 31

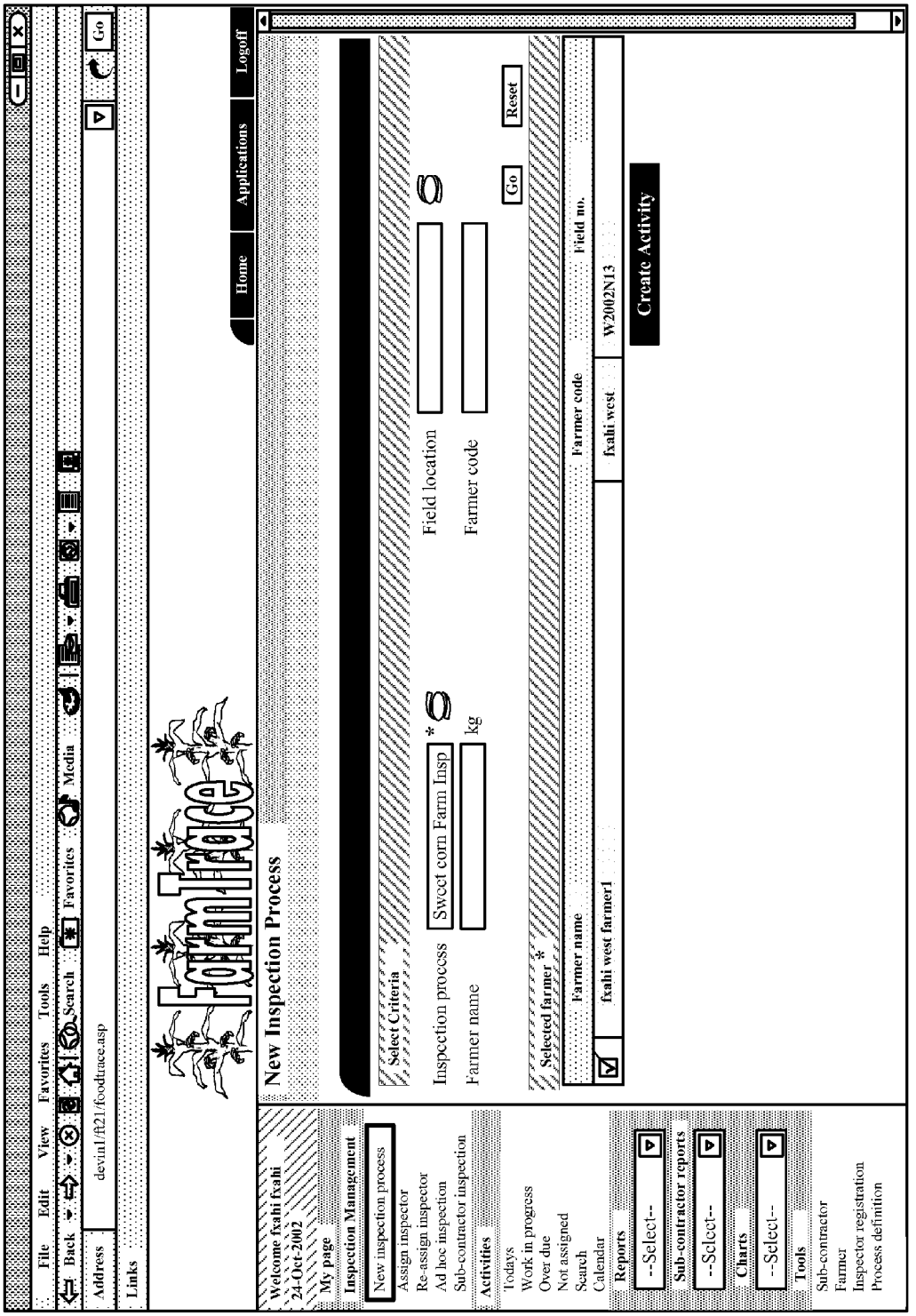

File Edit View Favorites Tools Help
Back Search Favorites Media
Address devin1/f21/foodtrace.asp
Go
Links
FarmTrace
Home
Applications
Logoff
Welcome fxahi fxahi
24-Oct-2002
My page
Inspection Management
New inspection process
Assign inspector
Re-assign inspector
Ad hoc inspection
Sub-contractor inspection
Activities
Todays
Work in progress
Over due
Not assigned
Search
Calendar
Reports
--Select--
Sub-contractor reports
--Select--
Charts
--Select--
Tools
Sub-contractor
Farmer
Inspector registration
Process definition
New Inspection Process
Select Criteria
Inspection process
Sweet corn Farm Insp
Farmer name
kg
Field location
Farmer code
Go
Reset
Selected farmer *
Farmer name
Farmer code
Field no.
fxahi west farmer1
fxahi west
W2002N13
Create Activity

Fig. 32

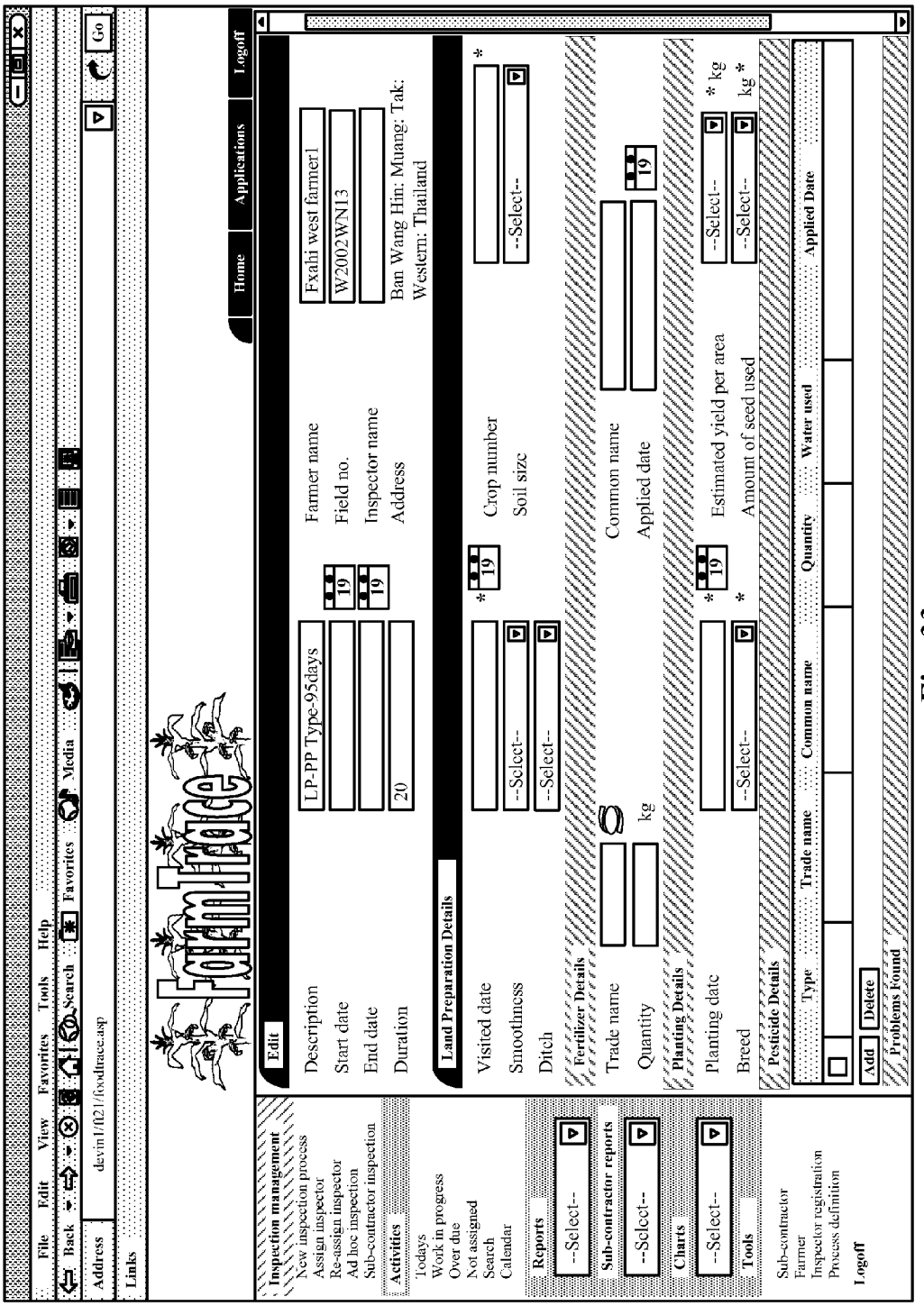

File Edit View Favorites Tools Help
Back Search Favorites Media
Address devin1/f021/foodtrace.asp
Go
Links
FoodTrace
Home
Applications
Logoff
Inspection management
New inspection process
Assign inspector
Re-assign inspector
Ad hoc inspection
Sub-contractor inspection
Activities
Todays
Work in progress
Over due
Not assigned
Search
Calendar
Reports
--Select--
Sub-contractor reports
--Select--
Charts
--Select--
Tools
Sub-contractor
Farmer
Inspector registration
Process definition
Logoff
Edit
Description
LP-PP Type-95days
Start date
End date
Duration
20
Farmer name
Fxahi west farmer1
Field no.
W2002WN13
Inspector name
Address
Ban Wang Hin; Muang; Tak; Western; Thailand
Land Preparation Details
Visited date
Smoothness
Ditch
--Select--
Crop number
Soil size
Fertilizer Details
Trade name
Quantity
kg
Common name
Applied date
Planting Details
Planting date
Breed
Estimated yield per area
Amount of seed used
kg
Pesticide Details
Type
Trade name
Common name
Quantity
Water used
Applied Date
Add
Delete
Problems Found

Fig. 33

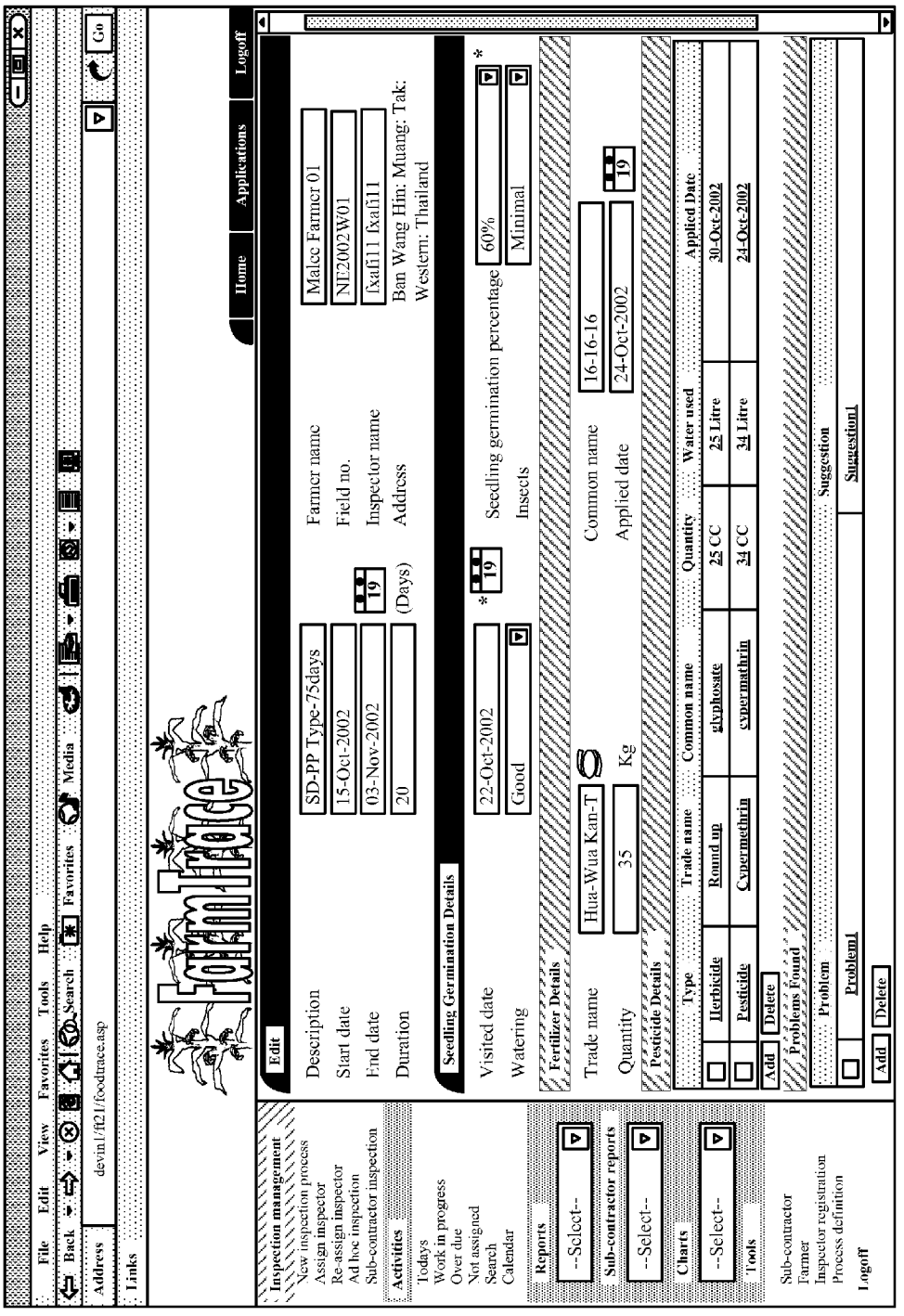

File Edit View Favorites Tools Help
Back Search Favorites Media
Address devinl/ft21/foodtrace.asp
Links
Go
Home
Applications
Logoff
Inspection management
New inspection process
Assign inspector
Re-assign inspector
Ad hoc inspection
Sub-contractor inspection
Activities
Todays
Work in progress
Over due
Not assigned
Search
Calendar
Reports
--Select--
Sub-contractor reports
--Select--
Charts
--Select--
Tools
Sub-contractor
Farmer
Inspector registration
Process definition
Logoff
Edit
Description
Start date
End date
Duration
SD-PP Type-75days
15-Oct-2002
03-Nov-2002
20
(Days)
Farmer name
Field no.
Inspector name
Address
Malee Farmer 01
NE2002W01
fxafi11 fxafi11
Ban Wang Hin. Muang: Tak: Western: Thailand
Seedling Germination Details
Visited date
Watering
22-Oct-2002
Good
Seedling germination percentage
Insects
60%
Minimal
Fertilizer Details
Trade name
Quantity
Hua-Wua Kan-T
35
Kg
Common name
Applied date
16-16-16
24-Oct-2002
Pesticide Details
Type
Trade name
Common name
Quantity
Water used
Applied Date
Herbicide
Round up
glyphosate
25 CC
25 Litre
30-Oct-2002
Pesticide
Cypermethrin
cypermathrin
34 CC
34 Litre
24-Oct-2002
Add
Delete
Problems Found
Problem
Suggestion
Problem1
Suggestion1
Add
Delete

Fig. 34

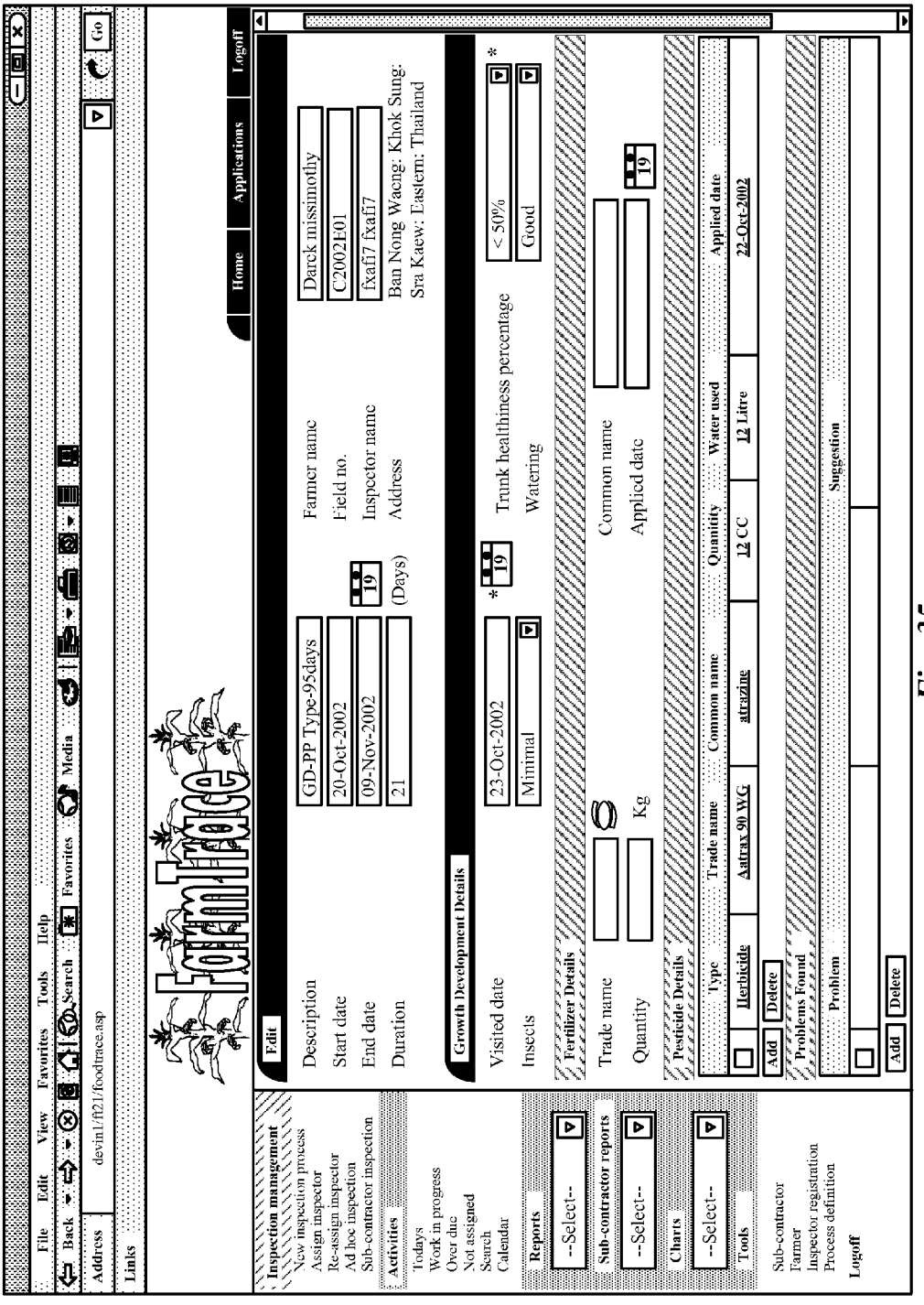

File Edit View Favorites Tools Help
Back Search Favorites Media
Address devin1/ft21/foodtrace.asp
Go
Links
FoodTrace
Home
Applications
Logoff
Inspection management
New inspection process
Assign inspector
Re-assign inspector
Ad hoc inspection
Sub-contractor inspection
Activities
Todays
Work in progress
Over due
Not assigned
Search
Calendar
Reports
--Select--
Sub-contractor reports
--Select--
Charts
--Select--
Tools
Sub-contractor
Farmer
Inspector registration
Process definition
Logoff
Edit
Description
GD-PP Type-95days
Start date
20-Oct-2002
End date
09-Nov-2002
Duration
21
(Days)
Farmer name
Darck missimothy
Field no.
C2002E01
Inspector name
fxafi7 fxafi7
Address
Ban Nong Waeng: Khok Sung: Sra Kaew: Eastern: Thailand
Growth Development Details
Visited date
23-Oct-2002
Insects
Minimal
Trunk healthiness percentage
< 50%
Watering
Good
Fertilizer Details
Trade name
Quantity
Kg
Common name
Applied date
Pesticide Details
Type
Trade name
Common name
Quantity
Water used
Applied date
Herbicide
Aatrax 90 WG
atrazine
12 CC
12 Litre
22-Oct-2002
Add
Delete
Problems Found
Problem
Suggestion
Add
Delete

Fig. 35

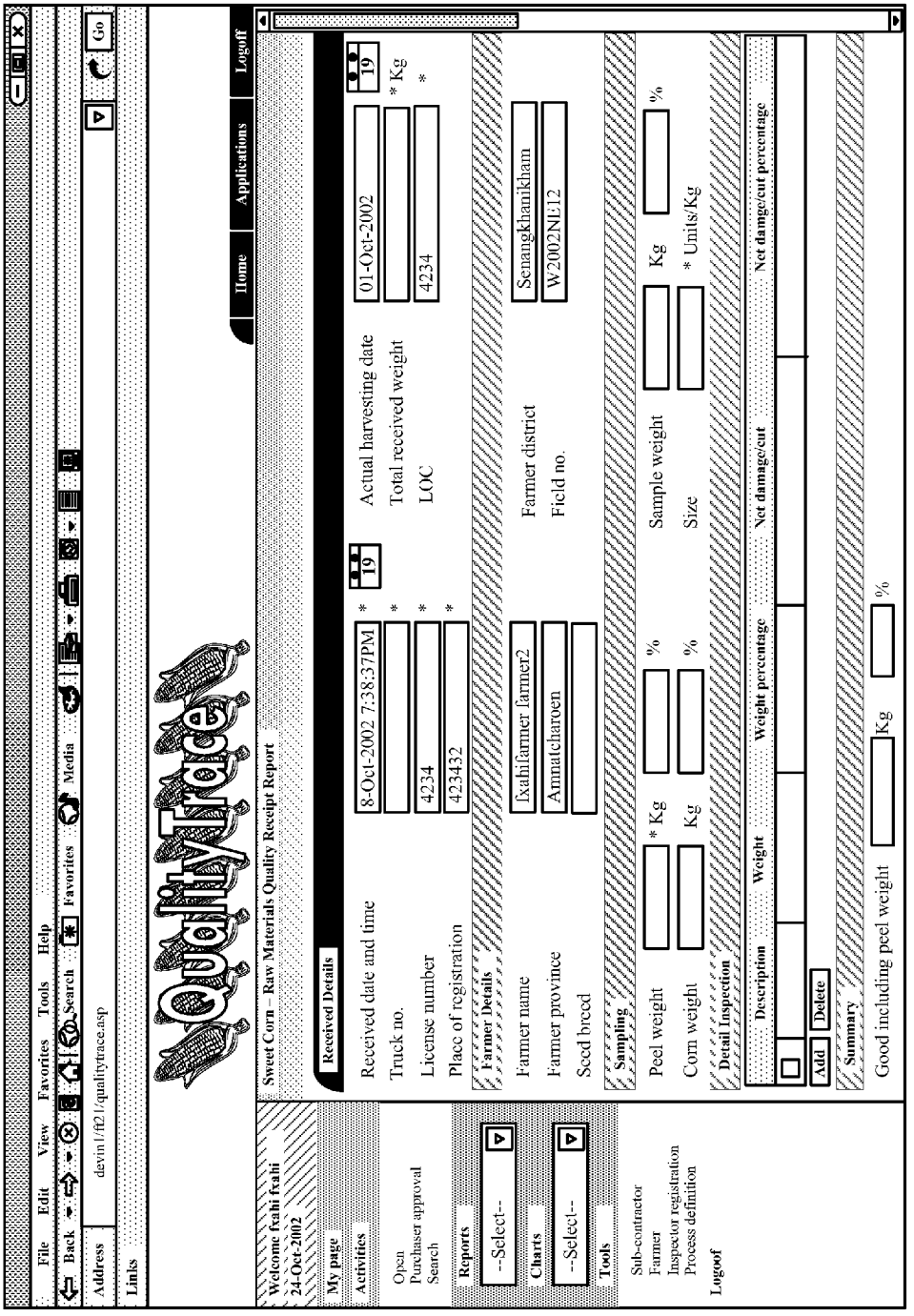

File Edit View Favorites Tools Help
Back Search Favorites Media
Address devin1/ft21/qualitytrace.asp
Go
Links
QualityTrace
Welcome fxahi fxahi
24-Oct-2002
Logoff
Home
Applications
Sweet Corn – Raw Materials Quality Receipt Report
My page
Activities
Open
Purchaser approval
Search
Reports
--Select--
Charts
--Select--
Tools
Sub-contractor
Farmer
Inspector registration
Process definition
Logoof
Received Details
Received date and time
8-Oct-2002 7:38:37PM
Truck no.
License number
4234
Place of registration
423432
Actual harvesting date
01-Oct-2002
Total received weight
* Kg
LOC
4234
Farmer Details
Farmer name
fxahifarmer farmer2
Farmer province
Amnatcharoen
Seed breed
Farmer district
Senangkhanikham
Field no.
W2002NU12
Sampling
Peel weight
* Kg
Corn weight
Kg
Sample weight
Kg
Size
* Units/Kg
Detail Inspection
Description
Weight
Weight percentage
Net damage/cut
Net damage/cut percentage
Add
Delete
Summary
Good including peel weight
Kg
%

Fig. 36

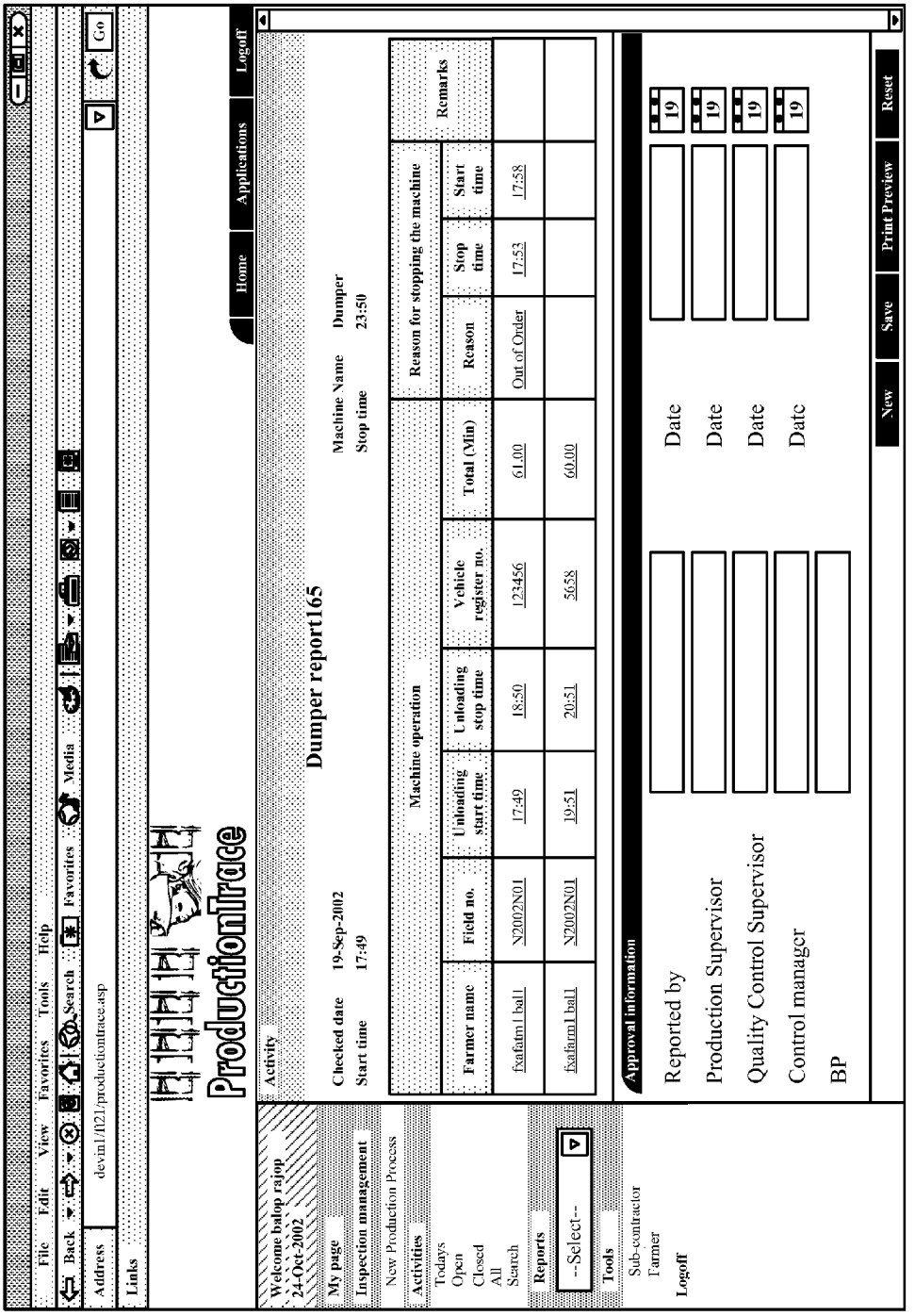

File Edit View Favorites Tools Help
Back Search Favorites Media
Address devin1/f121/productiontrace.asp
Go
Links
ProductionTrace
Home
Applications
Logoff
Activity
Welcome balop rajop
24-Oct-2002
My page
Inspection management
New Production Process
Activities
Todays
Open
Closed
All
Search
Reports
--Select--
Tools
Sub-contractor
Farmer
Logoff
Dumper report165
Checked date 19-Sep-2002
Start time 17:49
Machine Name Dumper
Stop time 23:50
Machine operation
Reason for stopping the machine
Farmer name
Field no.
Unloading start time
Unloading stop time
Vehicle register no.
Total (Min)
Reason
Stop time
Start time
Remarks
fxafatm1 ball
N2002N01
17:49
18:50
123456
61.00
Out of Order
17:53
17:58
fxafarm1 ball
N2002N01
19:51
20:51
3658
60.00
Approval information
Reported by
Date
Production Supervisor
Date
Quality Control Supervisor
Date
Control manager
Date
BP
19
New
Save
Print Preview
Reset

Fig. 37

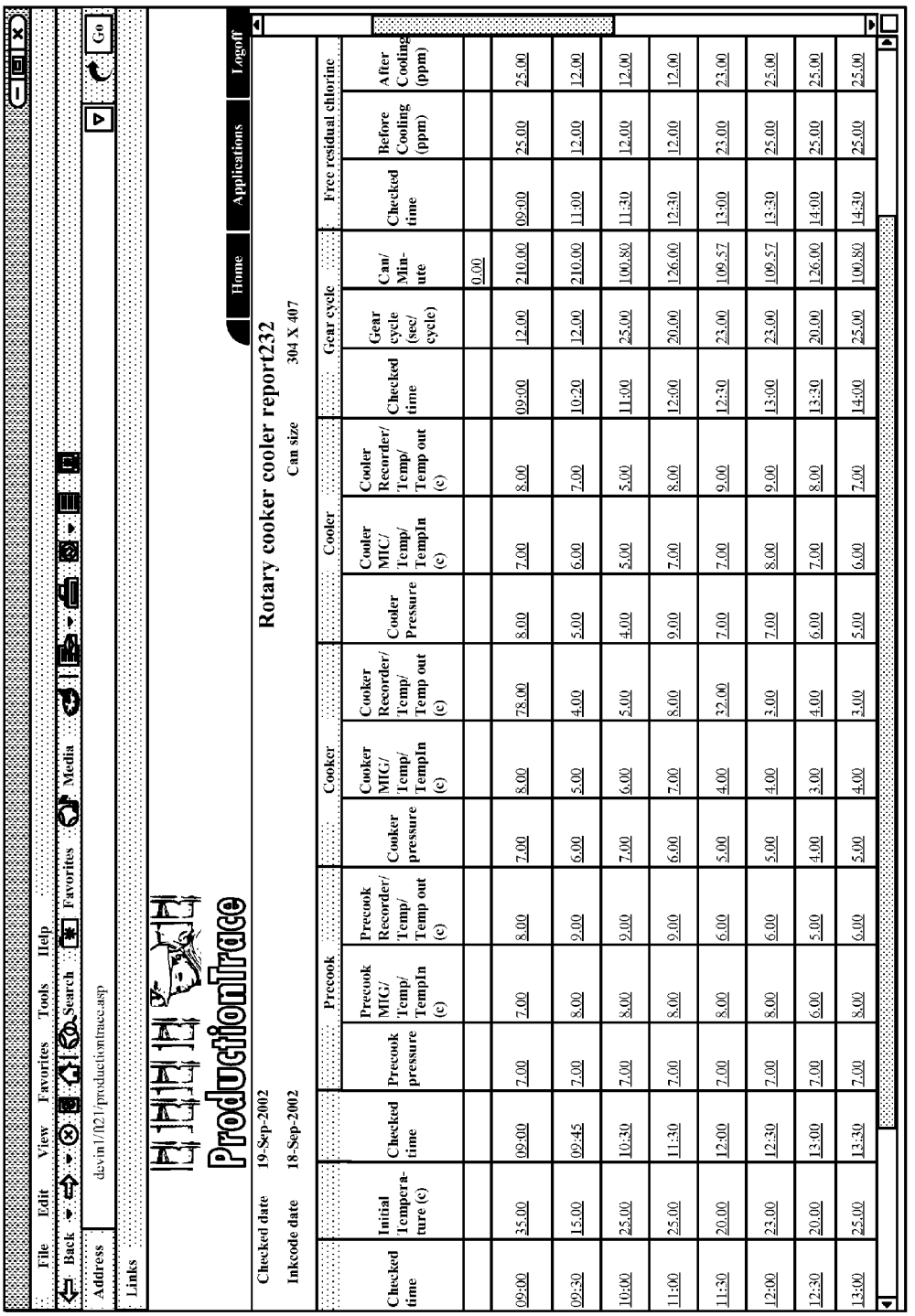

File Edit View Favorites Tools Help
Back Search Favorites Media
Address devin1/f21/productiontrace.asp
Go
Links
ProductionTrace
Home
Applications
Logoff
Checked date 19-Sep-2002
Inkcode date 18-Sep-2002
Rotary cooker cooler report232
Can size 304 X 407
Precook
Cooker
Cooler
Gear cycle
Free residual chlorine
Checked time
Initial Temperature (c)
Checked time
Precook pressure
Precook MIG/ Temp/ TempIn (c)
Precook Recorder/ Temp/ Temp out (c)
Cooker pressure
Cooker MIG/ Temp/ TempIn (c)
Cooker Recorder/ Temp/ Temp out (c)
Cooker Pressure
Cooler MIC/ Temp/ TempIn (c)
Cooler Recorder/ Temp/ Temp out (c)
Checked time
Gear cycle (sec/ cycle)
Can/ Minute
Checked time
Before Cooling (ppm)
After Cooling (ppm)
09:00 35.00 09:00 7.00 7.00 8.00 7.00 8.00 7.00 8.00 7.00 8.00 09:00 12.00 210.00 09:00 25.00 25.00
09:30 15.00 09:45 7.00 8.00 9.00 6.00 5.00 4.00 5.00 6.00 5.00 7.00 10:20 12.00 210.00 11:00 12.00 12.00
10:00 25.00 10:30 7.00 8.00 9.00 7.00 6.00 5.00 4.00 5.00 5.00 5.00 11:00 25.00 100.80 11:30 12.00 12.00
11:00 25.00 11:30 7.00 8.00 9.00 6.00 7.00 8.00 9.00 7.00 8.00 8.00 12:00 20.00 126.00 12:30 12.00 12.00
11:30 20.00 12:00 7.00 8.00 6.00 5.00 4.00 32.00 7.00 7.00 9.00 9.00 12:30 23.00 109.57 13:00 23.00 23.00
12:00 23.00 12:30 7.00 8.00 6.00 5.00 4.00 3.00 7.00 8.00 9.00 9.00 13:00 23.00 109.57 13:30 25.00 25.00
12:30 20.00 13:00 7.00 6.00 5.00 4.00 3.00 4.00 6.00 7.00 8.00 8.00 13:30 20.00 126.00 14:00 25.00 25.00
13:00 25.00 13:30 7.00 8.00 6.00 5.00 4.00 3.00 5.00 6.00 7.00 7.00 14:00 25.00 100.80 14:30 25.00 25.00

Fig. 38

FOOD TRACING AND TRACKING SYSTEM AND METHOD

PRIORITY CLAIM

[0001] This application is a continuation of U.S. patent application Ser. No. 13/736,887 filed on Jan. 8, 2013 which is a continuation of U.S. patent application Ser. No. 10/421,630 filed on Apr. 22, 2003 now U.S. Pat. No. 8,392,225 which claims priority from Provisional Application Nos. 60/375,202 and 60/375,192 both of which were filed Apr. 22, 2002. Each of the foregoing applications are hereby incorporated by reference.

FIELD OF THE INVENTION

[0002] This invention relates generally to supply chain tracing and tracking and, more specifically, to food tracing and tracking

BACKGROUND OF THE INVENTION

[0003] The food industry has a relatively low technology penetration and companies vary widely in their ability to provide information to their partners in any given supply-chain. This inability to provide information is compounded by the complex nature of the supply-chains themselves. The supply chains consist of a complex maze of sequence and parallelisms that can be arbitrarily mixed and changed with time as shown in the FIG. **1**.

[0004] Many companies (supply-stage legal entities) or a combination of supply-chain legal entities) require a complex structure that enables maintenance of the manufacturing processes across various departments, divisions or even different companies. Further, when companies are being asked to perform a trace of a product they fail to be able to provide answers to questions such as: what is in the container on the ship; how many pallets are inside the container; how many boxes are inside the pallets; how many cans are inside the box; what is inside the can; where did the content come from; how was it grown; what fertilizer was used; what pesticides were used; when was the seed sown; what type of seed was used; was the farm next to a power plant; did the farm have toilets; what manufacturing processes were used, etc.

[0005] Existing business enterprise software and logistics software vendors such as; SAP, Oracle, 12, People-Soft and Manugistics fail to be able to accommodate the fact that the food supply-chain will be in a constant state of flux. The supply-chain entities continually aim to optimize their resources, reduce their costs, and increase their efficiencies while still meeting all regulatory and commercial constraints. In practice, this means that the supply-chain entities constantly change their suppliers, their supply-chain processes and stages.

[0006] Because the supply-chain is an environment of constant flux, the existing systems cannot change during run-time without affecting the database structure and application code. This means that no application easily adaptable for defining a new process or changing on existing process at the same time. In other words, the present systems create new databases when the primary application structure is altered. In addition, the present systems fail to consider the time taken for a product to travel the supply chain (e.g., farm to table).

[0007] As shown in FIG. **2**, traditional enterprise software vendor (ES) provide software such as Enterprise Resources Planning (ERP), Material Requirements Planning (MRP) or financial and accounting software. These types of software applications help companies manage resources within their own business environment (inside the box). These types of software are usually very expensive and thus not all participants within the supply chain can afford them. In the food industry very few of the manufactures/suppliers have ERP-type solutions outside the USA and EU markets. Traditional logistics software vendors provide software for warehouse management, purchasing and automated inventory replenishment solutions. These types of software applications are also expensive and very few companies within the food industry supply-chain can afford them. They are designed to link between companies that have installed traditional enterprise software. They do not solve the problems associated with food safety and traceability.

[0008] Because the supply-chain is an environment of constant flux, there exists a need to have a structure capable of being changed during run-time itself without affecting the database structure and application code. There is a need to be able to define a new process or change an existing process at the same time. In other words, the system does not create new databases when the primary application structure is altered. Also, there exists a need to take into account the time taken for a product to travel the supply chain from farm to table.

SUMMARY OF THE INVENTION

[0009] The present invention allows small, medium and large-size companies that operate within these supply-chains, to exchange information in near real-time and bi-directionally throughout the entire supply-chain while maintaining data integrity and appropriate levels of security at all times. The present invention performs this by providing a batch-oriented process having any number of stages connected in any mix of parallel or serial order, nested to any depth. The present invention can be implemented in any industry that requires business process set-up and changes, e.g., food, pharmaceuticals, precious stones, electronic components, etc.

[0010] Also, the present invention supports continuous processes that can be approximated by a batch process.

[0011] The present invention enables a continuous linkage across the supply-chain entities while allowing the configuration or reconfiguration of the supply-chain entities to be changed, as and when required, in real or near real-time. The present invention accomplishes the foregoing while being capable of optionally providing the following additional features: ensuring data integrity and data security, maintaining a continuous history over time without the need for data conversion, and providing each entity within the supply chain the option of publishing their identity and data to the other supply chain entities. New fields can be added as needed for processes and materials. The present invention supports distributed data hosted on various machines by various organizations over a public or private data network.

[0012] The present invention provides the ability to create any processes that are sequential or parallel, plus is able to change these dynamically (i.e., at run time). The present invention allows for manipulation at run time of a directed graph. The directed graph includes nodes that are connected by arcs from a source node to a target node. The nodes are supply chain stages and the arcs are material lots that enter and exit the supply chain stages. The present invention permits both the definition of a process and the instantiation of a process to be defined at run time. Furthermore, the present

invention can readily customize the processing for the particular needs of a company. The present invention can track the evolution of a food process for a particular company.

[0013] The present invention provides a food traceability application with advances from conventional database modeling. The food traceability application includes a new paradigm of soft-coded value patterns that allows for a very flexible, extensible and robust means of handling the complex supply chain requirements.

[0014] The present invention enables all levels of enterprise from low, limited complexity and low technical capabilities to high complexity and high technical capabilities to participate in a wider, more complex food industry supply-chain. The present invention includes the following optional features:

[0015] Distributed

[0016] International

[0017] Scalable

[0018] Sequence and parallelism that can be arbitrarily mixed

[0019] Standardized processes

[0020] The present invention allows modifications to supply chain link, processes, and procedures. The number and links in the supply-chain can be increased or decreased as required. The links can be configured in any configuration of sequential or parallelism. Changes can be made to supply chain routes, process, and procedures at any time, even while the information system is in continuous operation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] The preferred and alternative embodiments of the present invention are described in detail below with reference to the following drawings.

[0022] FIGS. **1** and **2** are illustrations of the prior art;

[0023] FIG. **3**A is a system block diagram of the present invention;

[0024] FIG. **3**B is a diagram of the different software layers of the present invention;

[0025] FIG. **4** is an explanation of notation used in describing the present invention;

[0026] FIGS. **5-11** are software model diagrams of components of the present invention;

[0027] FIGS. **12-15** are directed graphs shown as examples of the present invention; and

[0028] FIGS. **16-38** are examples of user interfaces formed in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0029] The present invention is preferably implemented as a food traceability software application, but could be for any number of supply chains. The present invention includes a number of component software applications. FIG. **3**A provides an overview example of a system **40** formed in accordance with the present invention. The present invention allows for a very flexible, extensible and robust means of handling the complex supply chain requirements. As shown in FIG. **3**A, the system **40** includes one or more servers **42** and user computer devices **44**. Users in a supply chain, such as farmers, inspectors, producers, manufacturers, grocers, consumers, or restaurants, are linked through the over a network **46** (Internet or intra-net) to the food traceability application executed by a server **42**. Examples of the user computer devices **44** are PDAs, wireless devices, browsers, existing legacy systems, or other computer-based devices.

[0030] The food traceability application provides traceability of food that meets regulatory and commercially driven industry objectives. All users in the food supply chain can access or input, at pre-determined level of details based on relevancy and appropriateness, critical data on the life-cycle of any product. Users external to the supply chain, such as regulatory agencies, can access relevant data with approval from parties involved.

[0031] The application allows modifications to supply-chain links, processes, and procedures to be easily reconfigured on-line instantly over a network connection. For example: the number of links within each supply-chain can be increased or decreased as the need arises. Also the processes within each link can also be configured on-line for any configuration of sequential or parallelism. Thus, changes can be made in the supply chain routes, processes, and procedures at any time even while the system **40** is in continuous operation.

[0032] FIG. **3**B provides an example of a software architecture **50** of the present invention. The architecture **50** includes a Presentation Abstraction Layer **52** that insulates the user access devices such as desktop computers, PDAs, cellphones, etc, from changes in underlying presentation services. Thus, changes in servers do not affect the ability of users to retrieve services. The Presentation Abstraction Layer **52** provides filtering, formatting, encryption, and language conversion services for all the underlying presentation services.

[0033] A Presentation Services Layer **54** provides an interface between underlying applications and filtering, formatting, encryption, and language conversion services of the Presentation Abstraction Layer **52**. Each presentation service receives display requests, converts those display requests into application requests, formats the query results, and passes those results to the Presentation Abstraction Layer **54** for post-processing.

[0034] An Application Services Layer **56** includes value-added offerings for which subscribers have paid. Each application offering exists on one or more servers. For example, the Application Services Layer **56** includes a food trace service offering.

[0035] Application services are built using foundation services **58**. Those foundation services perform work common to all applications, but specific to none of those applications. Identifying system time, translating names to addresses, management directories of computers, users, applications and software objects, reporting alarm conditions, controlling component access and managing communication among system elements are all examples of foundation services shared among all applications.

[0036] Data Abstraction Layer (DAL) **60** provides a degree of insulation between application and foundation services and the underlying data stores on which they draw. The DAL **60** converts all requests and replies into relational constructs. By shielding foundation and application services from the specifics of an underlying data store, new applications don't get tightly linked to specific structures, with all the problems that characterize ERP, MRP and other legacy applications.

[0037] The following example illustrates various benefits of the present invention. A manufacturer that is exporting produce (corn) from Thailand to a user in the UK.

[0038] Step 1. The manufacturer's inspectors use a farm component of the present invention to capture information for food traceability from their existing contract farmers.

[0039] Step 2. The manufacturer's QA department use a quality component to capture information for food traceability when the produce arrives at their manufacturing facility from the farm.

[0040] Step 3. The manufacturer's production personnel use a production component to capture the critical information required for food traceability/safety, and tie this information to the physical product (i.e., the bar code and batch number).

[0041] The present invention solution has now captured the information needed by regulatory and commercial users.

[0042] Step 4. The manufacturer uses a (distributed) database and communications infrastructure of the present invention to disseminate this information on request and by exception to the users that need this information.

[0043] Step 5. A user using the trace component with the manufacturer's permission to request information about food safety and traceability. The user does this by simply typing or scanning the barcode and batch number found on the product into the trace component to perform a trace. The user is now able to act in near real time on issues connected with food safety and traceability.

[0044] Step 6. Other users in the supply chain such a distributors, cold storage, logistical providers, etc. can be captured by using a shipping comonent.

[0045] The software of the present invention includes a Meta model that defines types, fields and complex structure and can be populated at runtime. Instead of hard coding fields as columns of specific tables, a Meta model (metadata structure) is provided for storing field definition and fields data. This is considered soft coding. Soft-coding allows users to efficiently manage evolution of the model as the scope expands. Application programming code is separated from the details of a particular usage, yielding highly flexible, customizable, and yet efficient software.

Brief Explanation of the Data Modeling Notation

[0046] FIGS. **5-16** illustrate a model of the present invention in OMT modeling notation that is a popular enhancement of the Entity-Relationship approach. FIG. **4** summarizes modeling constructs that are to describe the present invention. Object models are built from three basic constructs: classes, associations, and generalizations.

[0047] A class is denoted by a box and describes objects with common attributes, behavior, and intent. As shown later on MaterialLot, SupplyChainStageType, and UnitOfMeasure are examples of classes. Attributes describe values of the objects in a class and may be listed in a second portion of a class box. For example, name is an attribute of class UnitOfMeasure. By convention the attributes for a class are shown in one figure where the class is defined and the attributes are suppressed for all other places where a reference to the class occurs. Generalization organizes classes by their similarities and differences and is denoted by a triangle.

[0048] An association describes the relationship of objects of two or more classes and is indicated by a line. The adornment on each end of an association line denotes multiplicity. Multiplicity specifies how many instances of one class may relate to an instance of an associated class. A solid ball means 'many' (zero or more); a hollow ball means 'at most one' (zero or one); a line without a multiplicity symbol means exactly one.

[0049] Material Processing package

[0050] FIGS. **5**A and **5**B show a software model **100** that allows tracing of the handling of food in object oriented notation. A SupplyChainStage **104** is an element of processing that is relevant to the handling of materials, such as food; examples include farming, manufacturing, inspection, approval, transport, and retail. A MaterialLot **106** is a substance relevant to the processing of a SupplyChainStage **104**; examples include food items such as raw corn, washed corn, cooked corn, and canned corn as well as byproducts, wastes, chemicals, and pesticides. It can be appreciated that various processing elements and substances relevant to various processing elements can be used.

[0051] Because the present invention uses an object oriented model as shown in FIG. **5**A and **5**B, the present invention can create directed graphs that can be scaled to include any number of processing stages with any arrangement of parallel or serial processes or nodes of the directed graph. Also, the directed graph can be dynamically adapted. The present invention can also be readily distributed and can handle an arbitrarily complex process. The model **100** is customizable to any number of different manufacturing processes (e.g., corn, pineapple, shrimp, etc.) or company-specific practices. The model **100** supports data distributed between multiple servers **42** over the network **46**. As long as access permissions are granted, the present invention can navigate from computer to computer to trace the flow of foodstuffs.

[0052] Returning to the model **100** in FIG. **5**B, the SupplyChainStage **104** may have any number of MaterialLot **106** as input and any number as output. The MaterialLot **106** may enter and exit at most one SupplyChainStage **104**. Each MaterialLot **106** is associated with an owner LegalEntity **108** and any number of accessing LegalEntities **108**. A MaterialLot **106** owner can give others permission to access the data. Only the owner or a designate of the owner (direct or indirect) can grant access permissions.

[0053] A MaterialMaster **110** stores general data. There is one MaterialMaster record for each Global Trade Item Number (GTIN). GTIN is an international standard item numbering that is replacing the European Article Number (EAN). The EAN in turn has replaced the UPC, Universal Product Code, that has been used in the US and Canada.

[0054] For example, when one picks up a can of corn in a store, there is a bar code on the can. This bar code is a GTIN. There is one MaterialMaster record for each GTIN. In contrast, there can be many cans of corn; each of which could be stored as a separate MaterialLot **106**, all referring to a common MaterialMaster record.

[0055] A SupplyChainStageType **114** describes individual SupplyChainStages **104** in a similar manner to the way that MaterialMaster **110** describes MaterialLot **106**. A SupplyChainStageType **114** has an expected duration (e.g., how long does it normally take to decob corn). Expected duration with time thresholds can be set for warning and error notices.

[0056] An Application **118** describes how various SupplyChainStageTypes **114** and their instances are grouped into unique applications. For example, an Application object includes a Farm Management application, a Quality Management Application, a Production Management Application, a Shipping and Logistics Management application, etc. Appli-

cation **118** also describes how various ProcessPrototypes **120** are made available for an Application **118**.

[0057] A LegalEntityRole **122** has multiple relationships with SupplyChainStages **104**. For example, a person could be both a manager and an inspector. An effectiveDatetime and expirationDatetime data for Legal EntityRole **122** notes when the binding of the person and RoleType (Manager, inspector) is in effect. For example, one person may serve as manager of a department for a few years and then another person may move into the job. Many LegalEntityRoles **122** can own a SupplyChainStage **104**.

[0058] A ProcessPrototype **120** is a group of MaterialLots **106** and SupplyChainStages **104**, that would normally connect together into a directed graph. Each time there is a new processing run for food, the user must create a new directed graph to record the precise relationship between processing stages and material that flows in and out. It would be tedious to construct each of these graphs by hand, over and over again. The notion of a ProcessPrototype **120** allows for easy construction of a new graph—just find the correct ProcessPrototype **120** and clone it to get a new ProcessPrototype **120** that can be used for the next food-processing run. The notion of a ProcessPrototype **120** allows for easy construction of a new graph—just find the correct ProcessPrototype **120** and clone it by copying all instances of its associated MaterialLot and SupplyChainStage classes. These new copies can then be used for the next food-processing run. The ProcessPrototype **120** is used to define repeatable processes.

[0059] The model **100** is able to readily handle recursion. For example, Pakfood freezes shrimp and inventories them as part of routine processing. On occasion the frozen shrimp are added to a later batch to make up a shortfall in certain shrimp sizes. As far as the model **100** is concerned, the recycled shrimp are just another material lot and a trace reveals that the recycled shrimp are from an earlier production batch.

[0060] At the core of the present invention is the notion of a directed graph. The directed graph is a standard computer science construct. A directed graph consists of nodes that are connected by arcs from a source node to a target node. The nodes are supply chain stages and the arcs are material lots that enter and exit the supply chain stages.

[0061] The model permits both the definition of a process and the instantiation of a process to be defined at run time. The definition of a process is found in the SupplyChainStageType, MaterialMaster, and ProcessPrototype classes. SupplyChainStageType and MaterialMaster define pertinent attributes for supply chain stages and material lots respectively. The ProcessPrototype defines standard processes that are then cloned each time an instantiation is needed. The MaterialLot and SupplyChainStage classes are the primary classes used for the instantiation. The present invention provides run time definition and instantiation of food processes.

[0062] FIG. **6** is an illustrative example of SupplyChainStages **170**, **172**, **174** connected with intervening MaterialLots, **182**, **184**, **186**, **188**.

[0063] FIG. **7** shows a more complex example as compared to that shown in FIG. **6**. In practice, any diagram with boxes and arrows constitute a valid directed graph and can be handled by the model **100**. With regards to the model **100**, a process is completely arbitrary. The definition of a process is a business decision and the model **100** accommodates any reasonable decision.

[0064] LEGAL EENTITY PACKAGE

[0065] In FIG. **8**, a LegalEntity **190** may be anyone of the following Organization **195**, a Person **196**, a LegalEntityRoleType **192**, or an Automation **198**. A LegalEntity **190** represents someone or something that is involved with the processing and handling of materials such as food. A LegalEntityRoleType **192** represents a job that a LegalEntity **190** fulfills. Purchasing agent, manager, and inspector are examples of LegalEntityRoleTypes **192**. Many business functions can be served either by the running of software (Automation **198**)—for these situations the effect of software cannot be distinguished from the efforts of Persons **196** and Organizations **195**

[0066] A LegalEntityRole **194** combines a LegalEntity **190** with a LegalEntityRoleType **192**. The LegalEntity **190** includes a parent-child relationship that LegalEntity **190** captures miscellaneous relationships between other LegalEntities **190**. The association is recursive and LegalEntities **190** can be structured to an arbitrary depth. Thus, for example, a company (an Organization **195**) can have multiple divisions (also Organizations **195**), a division can have multiple departments (more Organizations **195**), and a department can have multiple offices (still more Organizations **195**).

[0067] SOFTCODED VALUE PACKAGE

[0068] Some classes in the model **100** can have an arbitrary number of attributes. For example, numerous attributes are stored for Persons **196**, thus it is difficult to anticipate all of them in advance. Furthermore, the appropriate attributes can vary by customer, especially for MaterialLots **106** and SupplyChainStages **104**. The software is tailorable for different food or even non-food materials and customer processes. The model **100** is a good fit for discrete batches of a material that are processed which characterizes the food industry and some other industries. It is also a fit for some continuous processes that can be approximated by a batch process.

[0069] As shown in FIG. **9**, the present invention includes a mechanism for softcoding attributes and defining them at run time. A DescribedObject **204** has softcoded Values **212**. There is one record for each of the following objects: Person **196**, MaterialLot **106**, SupplyChainStage **104**. Each DescribedObject **204** has a specific DescribedObjectType **206**. Some examples of DescribedObjectTypes **206** are Person, various kinds of MaterialLots **106**, and various kinds of SupplyChainStages **104**. Thus there can be many Person DescribedObjects and each refers to a single Person DescribedObjectType record. Similarly, there can be many MaterialLot DescribedObjects each of which refers to the DescribedObjectType record for the kind of MaterialLot.

[0070] The model **100** states that DescribedObjects **204** must conform to Attribute **208** defined for the corresponding DescribedObjectType **206**. A corresponding database cannot enforce this constraint, so application code must enforce it. Some Attributes **208** are enumerated and have a pick list of possible values. An EnumValue **210** stores pick list values when they apply.

[0071] Values **212** are any of the following data types: number, string, or datetime. One of the first three fields is filled in (and the other two are null) for each Value record. Each Value **212** has a timestamp and LegalEntity **190** that is the source of the value. Thus, the softcoded value mechanism keeps a history of values. A Value **212** has a UnitOfMeasure **214** that overrides the default specified for its Attribute **208**.

[0072] Each Attribute **208** has a dataType (number, string, or datetime) indicating the appropriate field to fill in for each

Value **212**. String Values can have a maximum length. Minimum multiplicity indicates if a Value **212** of the Attribute **208** is required or optional for each DescribedObject **204**. Similarly, maximum multiplicity indicates if a Value **212** of the Attribute **208** are single-valued or can be multiple-valued for each DescribedObject **204**.

[0073] Some Attributes **208** are computed and have a corresponding formula. Formulas support simple arithmetic (−+* /), declarative if-then-else, and user defined functions. The functions can be invoked via a case statement using a label of the function name.

[0074] DESCRIBED OBJECT PACKAGE

[0075] As shown in FIG. **10**, the DescribedObjects **254** can have softcoded values or softcoded relationships.

[0076] As shown in FIG. **11**, the DescribedObject **254** is a placeholder for things that can have miscellaneous values and miscellaneous relationships. A DescribedObject **254** can have many Roles **262**. A Role **262** is one end of a Relationship **264**. Each Role corresponds to one DescribedObject **204** and one Relationship **264**.

[0077] A Relationship **264** is a binding between Roles **262**. Most Relationships **264** are binary, that is they have two Roles **262**. A DescribedObject **254** may have any number of Roles **262** and may therefore participate in any number of Relationships **264**. Each

[0078] Relationship **264** has effective and expiration dates that allows history tracking A Relationship **264** can be recorded in advance of when it is needed or after it becomes obsolete.

[0079] METADATA

[0080] As shown in FIG. **11**, the DescribedObjectType **270** is a category for DescribedObjects **254**. The DescribedObjectType **270** has one or many RoleTypes **272**. The RoleType **272** is a category for Roles **262**. By analogy, the RoleType **272** is one end of a RelationshipType **274**. Each RoleType **272** corresponds to one DescribedObjectType **270** and one RelationshipType **274**. MinMultiplicity is the minimum number of times that a DescribedObject **254** must participate in the Relationship **264** and is usually 0 or 1. MaxMultiplicity is the maximum number of times that a DescribedObject **254** can participate in the Relationship **264** and is usually 1 or many.

[0081] The RelationshipType **274** is a category for Relationships **264**. The RelationshipType **274** can have Attributes **276** describing potential Relationship **264** values, just as the DescribedObjectType **270** can have Attributes **276** describing potential DescribedObject values **254**. An Attribute **276** is a characteristic of the DescribedObject **254** or Relationship **264**. Each Attribute **276** belongs to one of the following: DescribedObjectType **270** or RelationshipType **274**.

Scenarios

[0082] Scenario 1

[0083] The following scenarios help describe the nature of change the food industry is subject to over time and how the present invention manages this change.

[0084] FIG. **12** shows a simple production line **400** for canned vegetables with the following production stages (mixing **402**, cooking **404**, canning **406**). The following eleven tables represent the production process using the model of the present invention. The SupplyChainStages are owned by the LegalEntityRoles (Mixed fruit manufacturer and inspector A).

[0085] In the following tables, metadata is represented in with a background pattern. Application setup data is represented in Bold. All other data is Transaction Data.

TABLE 1

SupplyChainStageType

Stage TypeID (PK)	Stage Type Name	Stage Duration
1	Mixing	0:10
2	Cooking	0:30
3	Canning	0:10

[0086] Table 1 is a SupplyChainStageType table that includes metadata that represents each of the supply chain stage types. There can be any number of stage types for an application.

TABLE 2

SupplyChainStage

StageID (PK)	Stage Name	StageType ID (FK)	StageStartDateTime	StageStop DateTime	StageLocation	Process ProtoTypeID
1	Mixing	1			Singapore	1
2	Cooking	2			Singapore	1
3	Canning	3			Singapore	1
4	**Mixing**	**1**	**9:00**	⍰	**Singapore**	
5	**Cooking**	**2**	**9:10**	**9:40**	**Singapore**	
6	**Canning**	**3**	**9:50**	**10:00**	**Singapore**	

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[0087] Table 2 is a SupplyChainStage table that stores various day-to-day operations and associated data. Table 2 is used to store dummy process data, which is used to create ProcessPrototype clones. The user can easily represent complex processes and create clones (copies) for ease of day-to-day data entry operations.

TABLE 3

Material Lot

Material LotID	Material LotName	Material Master Name	Material Quantity	Process ProtoType ID(FK)
1	Mixed Fruits			1
2	Cooked Fruits			1
3	Canned Fruits			1
4	Mixed Fruits		100	

TABLE 3-continued

Material Lot

Material LotID	Material LotName	Material Master Name	Material Quantity	Process ProtoType ID(FK)
5	Cooked Fruits		55	
6	Canned Fruits		25	

[0088] Table 3 is a MaterialLot table that is used to store information of various Material Lots used in the SupplyChainStages. Table 3 has dummy materials for the prototype and actual materials with values.

TABLE 4

Process Prototype

[0089] Table 4 is a ProcessPrototype table that includes metadata that represents a set of stages and MaterialLot from the real SupplyChain process run. The user can create a dummy run first and then create a new ProcessProtoType from it. Table 4 holds all the related information of the PrototypeName metadata and a dummy process is identified by the

[0090] Prototype Name. The user can easily add new SupplyChainStages, delete existing SupplyChainStageStages, and change the direction of the supply chain.

TABLE 5

Application

ApplicationID	Application Name
1	Mixed Fruit Production Trace

[0091] Table 5 is an Application table that defines all the SupplyChainStageTypes and ProcessPrototypes that are available for the application. A group of SupplyChainStages are defined as belonging to an Application. For example, in a sweet corn process the following component applications are used: Farm component; Quality component; and Production component.

TABLE 6

LegalEntity Role

LegalEntity RoleID	LegalEntity RoleName	LegalEntity Effective Datetime	LegalEntity expiration Datetime
1	Inspector A	1/1/2002 9:00	
2	Mixed Fruit Manufacturer	1/1/2000 10:00	

[0092] Table 6 is a LegalEntityRole table that stores the information of various legal entity roles. The manufacturer (e.g., Mixed Fruit Manufacturer) own some SupplyChain stages. The inspector who plays a role in the inspection process may also be related to the same SupplyChain Stages as the manufacturer.

TABLE 7

MaterialLot IN SupplyChainStage

MaterialLotID	SupplyChainStageID
1	2
2	3
4	5
5	6

TABLE 8

MaterialLot OUT SupplyChainStage

MaterialLotID	SupplyChainStageID
1	1
2	2
3	3
4	4
5	5
6	6

[0093] Tables 7 and 8 are used to store information of various Material Lots used in the SupplyChainStages. Materials going IN and material going OUT connect the SupplyChainStages.

TABLE 9

ProcessProtoType Application

ProcessProtoTypeID	ApplicationID
1	1

[0094] Table 9 stores the information of which process prototypes are available for the application.

TABLE 10

SupplyChainStageType Application

SupplyChainStageTypeID	ApplicationID
1	1
2	1
3	1

[0095] Table 10 stores the information of which SupplyChainStage types are available for the application. For example, SupplyChainStage type structures are defined for Farm Inspection, Production, Quality, Shipping, etc and the application would make use of the defined structures.

TABLE 11

SupplyChainStage LegalEntityRole

SupplyChainStageID	LegalEntityRoleID
1	2
2	2
3	2
4	1
5	1

TABLE 11-continued

SupplyChainStage LegalEntityRole

SupplyChainStageID	LegalEntityRoleID
6	1
4	2
5	2
6	2

[0096] Table 11 stores the information of which SupplyChainStage types were created or modified by which legalEntity role (person) and to which organization legal entity the SupplyChainStage belongs to.

[0097] Scenario 2

[0098] In Scenario 2 a new parallel production line is add to Scenario 1. A company has set up a new parallel production line. An additional capacity for the Canning process is added.

[0099] Now the company has the two canning lines Canning B1 and Canning B2. The output of the Canning B1 line is Canned Fruits Small Can and the output of the Canning B2 line is Canned Fruits Large Can.

[0100] The SupplyChainStages are show in FIG. **13**.

[0101] Metadata is represented with background shading, Application setup data is represented in Bold, and all other data is Transaction Data.

TABLE 12

SupplyChainStageType

StageType	StageTypeName	StageDuration
1	Mixing	0:10
2	Cooking	0:30
3	Canning Small Cans	0:10
4	Canning Large Cans	0:13

[0102] In the above table a SupplyChainStage type is defined to record the activities in the Canning Large Cans process line.

TABLE 13

SupplyChainStage

StageID (PK)	Stage Name	StageType ID (FK)	StageStartDateTime	StageStop DateTime	StageLocation	Process ProtoTypeID
1	Mixing	1			Singapore	1
2	Cooking	2			Singapore	1
3	Canning	3			Singapore	1
4	**Mixing**	**1**	**1/3/2002 9:00**	**01/03/2002 9:10**	**Singapore**	
5	**Cooking**	**2**	**1/3/2002 9:10**	**1/3/2002 9:40**	**Singapore**	
6	**Canning**	**3**	**1/3/2002 9:50**	**1/3/2002 10:00**	**Singapore**	
7	Canning B?	4			Singapore	1
8	**Mixing**	**1**	**2/3/2002 9:00**	**2/3/2002 9:10**	**Singapore**	
9	**Cooking**	**2**	**2/3/2002 9:10**	**2/3/2002 9:40**	**Singapore**	
10	**Canning B?**	**3**	**2/3/2002 9:50**	**2/3/2002 10:00**	**Singapore**	
11	**Canning B?**	**4**	**2/3/2002 9:50**	**2/3/2002 10:03**	**Singapore**	

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TABLE 14

Material Lot

Material LotID	MaterialLotName	MaterialMaster Name	Material Quantity	ProcessProto TypeID(FK)
1	Mixed Fruits			1
2	Cooked Fruits			1
3	Canned Fruits Small			1
4	Mixed Fruits		100	
5	Cooked Fruits		90	
6	Canned Fruits Small		9	
7	Cooked Fruits			1
8	Canned Fruits Large			1
9	Mixed Fruits		200	
10	Cooked Fruits		100	
11	Cooked Fruits		100	
12	Canned Fruits Small		9	
13	Canned Fruits Large		7	

TABLE 15

Process Prototype

ProcessProtoTypeID (PK)	PrototypeName
1	New prototype with canning for Large cans

TABLE 16

Application

ApplicationID	Application Name
1	Mixed Fruit Production Trace

TABLE 17

LegalEntity Role

LegalEntityRoleID	LegalEntityRoleName	LegalEntityEffectiveDatetime	LegalEntityexpirtaionDatetime
1	Inspector A	Jan. 1, 2002 9:00	
2	Mixed Fruit Manufacturer	Jan. 1, 2000 10:00	

TABLE 18

MaterialLot IN SupplyChainStage

MaterialLotID	SupplyChainStageID
1	2
2	3
4	5
5	6
7	7
9	9
10	10
11	11

TABLE 19

MaterialLot OUT SupplyChainStage

MaterialLotID	SupplyChainStageID
1	1
2	2
3	3
4	4
5	5
6	6
8	7
9	8
10	9
11	9
12	10
13	11

[0103] Tables 18 and 19 are used to store information of various Material Lots used in the SupplyChainStages. Materials going IN and material going OUT connect the SupplyChainStages.

TABLE 20

ProcessProtoType Application

ProcessProtoTypeID	ApplicationID
1	1

TABLE 21

SupplyChainStageType Application

SupplyChainStageTypeID	ApplicationID
1	1
2	1
3	1
4	1

TABLE 22

SupplyChainStage LegalEntityRole

SupplyChainStageID	LegalEntityRoleID
1	2
2	2
3	2
4	1
5	1
6	1
4	2
5	2
6	2
8	1
9	1
10	1
11	1
8	2
9	2
10	2
11	2

[0104] Table 22 stores the information of which SupplyChainStage types was created or modified by the given legalEntity role (person) and to which organization legal entity the SupplyChainStage belongs to.

[0105] Scenario 3

[0106] In Scenario 3 a new cooling and CCP point are added to the production line of Scenario 2. The output of the Canning process line is sent to a new process line for cooling. There are separate cooling lines for Small Cans and Large Cans.

[0107] The typical SupplyChainStages are show in the above FIG. **14**. As a first step, the existing clone to support the new Cooling Process is modified. Two new stage types CCP for Small Can and CCP1 for large Can are declared.

TABLE 23

SupplyChainStageType

StageTypeID(PK)	StageTypeName	StageDuration
1	Mixing	0:10
2	Cooking	0:30
3	Canning Small Cans	0:10
4	Canning Large cans	0:13
5	CCP Small Cans	0:05
6	CCP Large Cans	0:07

TABLE 24

SupplyChainStage

StageID (PK)	Stage Name	StageType ID (FK)	StageStartDateTime	StageStop DateTime	StageLocation	Process ProtoTypeID
1	Mixing	1			Singapore	1
2	Cooking	2			Singapore	1
3	Canning B1	3			Singapore	1
4	**Mixing**	**1**	**1/3/2002 9:00**	**01/03/2002 9:10**	**Singapore**	
5	**Cooking**	**2**	**1/3/2002 9:10**	**1/3/2002 9:40**	**Singapore**	
6	**Canning**	**3**	**1/3/2002 9:50**	**1/3/2002 10:00**	**Singapore**	
7	Canning B2	4			Singapore	1
8	**Mixing**	**1**	**2/3/2002 9:00**	**2/3/2002 9:10**	**Singapore**	
9	**Cooking**	**2**	**2/3/2002 9:10**	2/3/2002 9:40	**Singapore**	
10	**Canning B1**	**3**	**2/3/2002 9:50**	**2/3/2002 10:00**	**Singapore**	
11	**Canning B2**	**4**	**2/3/2002 9:50**	**2/3/2002 10:03**	**Singapore**	
12	CCP small Cans	5			Singapore	1
13	CCP Large Cans	6			Singapore	1
14	**Mixing**	**1**	**1/10/2003 9:00**	**1/10/2003 9:10**	**Singapore**	
15	**Cooking**	**2**	**1/10/2003 9:10**	**1/3/2002 9:40**	**Singapore**	
16	**Canning B1**	**3**	**1/10/2003 9:50**	**1/10/2003 10:00**	**Singapore**	
17	**Canning B2**	**4**	**01/10/2003 9:50**	**01/10/2003 10:03**	**Singapore**	
18	**CCP Small Cans**	**5**	**1/10/2003 10:00**	1/10/2003 10:05	**Singapore**	
19	**CCP Large Cans**	**6**	**1/10/2003 10:03**	**01/10/2003 10:10**	**Singapore**	

TABLE 25

Material Lot

MaterialLotID	MaterialLotName	MaterialMasterName	MaterialQuantity	ProcessProtoTypeID (FK)
1	Mixed Fruits			1
2	CookedFruits			1
3	Canned Fruits Small			1
4	Mixed Fruits		100	
5	Cooked Fruits		90	
6	Canned Fruits Small		9	
7	Cooked Fruits			1
8	Canned Fruits Large			1
9	Mixed Fruits		200	
10	Cooked Fruits		100	
11	Cooked Fruits		100	
12	Canned Fruits Small		9	
13	Canned Fruits Large		7	
14	Cooked Small Cans			1
15	Cooked Large Cans			1
16	Mixed Fruits		300	
17	Cooked Fruits		200	
18	Cooked Fruits		100	
19	Canned Fruits Small		9	
20	Canned Fruits Large		7	
21	Cooled Small Cans		9	
22	Cooled Large Cans		7	

TABLE 26

Process Prototype

ProcessProtoTypeID (PK)	PrototypeName
1	New prototype with canning for Large cans

TABLE 27

Application

ApplicationID	Application Name
1	Mixed Fruit Production Trace

TABLE 28

LegalEntity Role

LegalEntity RoleID	LegalEntity RoleName	LegalEntityEffective Datetime	LegalEntityexpirtaion Datetime
1	Inspector A	Jan. 1, 2002 9:00	
2	Mixed Fruit Manufacturer	Jan. 1, 2000 10:00	

TABLE 29

MaterialLot IN SupplyChainStage

MaterialLotID	SupplyChainStageID
1	2
2	3
4	5
5	6
7	7
9	9
10	10
11	11
3	12
8	13
16	15
17	16
18	17
19	18
20	19

TABLE 30

MaterialLot OUT SupplyChainStage

MaterialLotID	SupplyChainStageID
1	1
2	2
3	3
4	4
5	5
6	6
7	2
8	7
9	8
10	9
11	9
12	10
13	11
14	12
15	13
16	14
17	15
18	15
19	16
20	17
21	18
22	19

TABLE 31

ProcessProtoType Application

ProcessProtoTypeID	ApplicationID
1	1

TABLE 32

SupplyChainStageType Application

SupplyChainStageTypeID	ApplicationID
1	1
2	1
3	1
4	1
5	1
6	1

TABLE 33

SupplyChainStage LegalEntityRole

SupplyChainStageID	LegalEntityRoleID
1	2
2	2
3	2
4	1
5	1
6	1
4	2
5	2
6	2
7	2
8	1
9	1
10	1
11	1
8	2
9	2
10	2
11	2
12	2
13	2
14	1
15	1
16	1
17	1
18	1
19	1
14	2
15	2
16	2
17	2
18	2
19	2

[0108] Scenario 4

[0109] In Scenario 4 the company has added a new cooking capacity to the production line of Scenario 3. The output of the Cooking B1 and Cooking B2 process line is sent to a new process line for Canning There are separate cooling lines for Small Cans and Large Cans.

[0110] The output of the SupplyChainStages Cooking B1 and Cooking B2 are sent to a common process for merging to mix the materials into one. The output of the Merging process is sent to Canning B1 or Canning B2 process line.

[0111] The SupplyChainStages are show in FIG. **15**. As a first step, the existing clone to support the new Cooking Process is modified. The existing Cooking Stage would be renamed as Cooking B1 and a new line added called Cooking B2. The output of these processes would be merged in the process Merge.

TABLE 34

SupplyChainStageType

StageTypeID(PK)	StageTypeName	StageDuration
1	Mixing	0:10
2	Cooking B1	0:30
3	Canning Small Cans	0:10
4	Canning Large Cans	0:13
5	CCP Small Cans	0:05
6	CCP Large Cans	0:07
7	Cooking B2	0:30
8	Merge	0:10

TABLE 35

SupplyChainStage

StageID (PK)	Stage Name	StageType ID (FK)	StageStartDateTime	StageStop DateTime	StageLocation	Process ProtoTypeID
1	Mixing	1			Singapore	1
2	Cooking	2			Singapore	1
3	Canning B1	3			Singapore	1
4	Mixing	1	1/3/2002 9:00	01/03/2002 9:10	Singapore	
5	Cooking	2	1/3/2002 9:10	1/3/2002 9:40	Singapore	
6	Canning	3	1/3/2002 9:50	1/3/2002 10:00	Singapore	
7	Canning B2	4			Singapore	1
8	Mixing	1	2/3/2002 9:00	2/3/2002 9:10	Singapore	
9	Cooking	2	2/3/2002 9:10	2/3/2002 9:40	Singapore	
10	Canning B1	3	2/3/2002 9:50	2/3/2002 10:00	Singapore	
11	Canning B2	4	2/3/2002 9:50	2/3/2002 10:03	Singapore	
12	CCP Small Cans	5			Singapore	1
13	CCP Large Cans	6			Singapore	1
14	Mixing	1	1/10/2003 9:00	1/10/2003 9:10	Singapore	
15	Cooking	2	1/10/2003 9:10	1/3/2002 9:40	Singapore	
16	Canning B1	3	1/10/2003 9:50	1/10/2003 10:00	Singapore	
17	Canning B2	4	01/10/2003 9:50	01/10/2003 10:03	Singapore	
18	CCP Small Cans	5	1/10/2003 10:00	1/10/2003 10:05	Singapore	
19	CCP Large Cans	6	1/10/2003 10:03	01/10/2003 10:10	Singapore	
20	Mixing	1			Singapore	2
21	Cooking B1	2			Singapore	2
22	Cooking B2	7			Singapore	2
23	Merge	8			Singapore	2
24	Canning B1	3			Singapore	2
25	Canning B2	4			Singapore	2
26	CCP Small Cans	5			Singapore	2
27	CCP Large Cans	6			Singapore	2
28	Mixing	1	2/10/2004 9:00	2/10/2004 9:10	Singapore	
29	Cooking B1	2	2/10/2004 9:10	2/10/2004 9:40	Singapore	
30	Cooking B2	7	2/10/2004 9:10	2/10/2004 9:40	Singapore	
31	Merge	8	2/10/2004 9:40	2/10/2004 9:50	Singapore	
32	Canning B1	3	2/10/2004 9:50	2/10/2004 10:00	Singapore	
33	Canning B2	4	2/10/2004 9:50	2/10/2004 10:03	Singapore	
34	CCP Small Cans	5	2/10/2004 10:03	2/10/2004 10:08	Singapore	
35	CCP Large Cans	6	2/10/2004 10:03	2/10/2004 10:10	Singapore	

TABLE 36

Material Lot

MaterialLot ID	MaterialLotName	Material-Master-Name	Material-Quantity	Process-ProtoType-ID(FK)
1	Mixed Fruits			1
2	Cooked Fruits			1
3	Canned Fruits Small			1
4	Mixed Fruits		100	
5	Cooked Fruits		90	
6	Canned Fruits Small		9	
7	Cooked Fruits			1
8	Canned Fruits Large			1
9	Mixed Fruits		200	
10	Cooked Fruits		100	
11	Cooked Fruits		100	
12	Canned Fruits Small		9	
13	Canned Fruits Large		7	
14	Cooled Small Cans			1
15	Cooled Large Cans			1
16	Mixed Fruits		300	
17	Cooked Fruits		200	
18	Cooked Fruits		100	
19	Canned Fruits Small		9	
20	Canned Fruits Large		7	
21	Cooled Small Cans		9	
22	Cooled Large Cans		7	
23	Mixed Fruits			2
24	Mixed Fruits			2
25	Cooked Fruits b1			2

TABLE 36-continued

Material Lot

MaterialLot ID	MaterialLotName	Material-Master-Name	Material-Quantity	Process-ProtoType-ID(FK)
26	Cooked Fruits b2			2
27	Merge Fruits B1			2
28	Merge Fruits B2			2
29	Canned Fruits Small			2
30	Canned Fruits Large			2
31	Cooled Small Cans			2
32	Cooled Large Cans			2
33	Mixed Fruits			
34	Mixed Fruits			
35	Cooked Fruits b1			
36	Cooked Fruits b2			
37	Merge Fruits B1			
38	Merge Fruits B2			
39	Canned Fruits Small			
40	Canned Fruits Large			
41	Cooled Small Cans			
42	Cooled Large Cans			

TABLE 37

Process Prototype

ProcessProto TypeID (PK)	PrototypeName
1	New prototype with canning for Large cans
2	Latest production with two cooking lines

TABLE 38

Application

ApplicationID	Application Name
1	Mixed Fruit Production Trace

TABLE 39

LegalEntity Role

LegalEntity-Role ID	LegalEntityRoleName	LegalEntity-Effective-Datetime	Legal-Entityexpirtaion-Datetime
1	Inspector A	1/1/2002 9:00	
2	Mixed Fruit Manufacturer	1/1/2000 10:00	

TABLE 40

MaterialLot IN SupplyChainStage

MaterialLotID	SupplyChainStageID
1	2
2	3
4	5
5	6
7	7
9	9
10	10
11	11
3	12
8	13
16	15
17	16
18	17
19	18
20	19
23	21
24	22
25	23
26	23
27	24
28	26
29	25
30	27
33	29
34	30
35	31
36	31
37	32
38	33
39	34
40	35

TABLE 41

MaterialLot OUT SupplyChainStage

MaterialLotID	SupplyChainStageID
1	1
2	2
3	3
4	4
5	5
6	6
7	2
8	7
9	8
10	9
11	9
12	10
13	11
14	12
15	13
16	14
17	15
18	15
19	16
20	17
21	18
22	19
23	20
24	20
25	21
26	22
27	23
28	23
29	24
30	26
31	25
32	27
33	28
34	28
35	29
36	30
37	31
38	31
39	32
40	33
41	34
42	35

Rows with a background pattern denotes prototype clone data.

TABLE 42

ProcessProtoType Application

ProcessProtoTypeID	ApplicationID
1	1
2	1

TABLE 43

SupplyChainStageType Application

SupplyChainStageTypeID	ApplicationID
1	1
2	1
3	1
4	1
5	1
6	1
7	1
8	1

TABLE 44

SupplyChainStage LegalEntityRole

SupplyChainStageID	LegalEntityRoleID
1	2
2	2
3	2
4	1
5	1
6	1
4	2
5	2
6	2
7	2
8	1
9	1
10	1
11	1
8	2
9	2
10	2
11	2
12	2
13	2
14	1
15	1
16	1
17	1
18	1
19	1
14	2
15	2
16	2
17	2
18	2
19	2
20	2
21	2
22	2
23	2
24	2
24	2
26	2
27	2
28	2
29	2
30	2
31	2
32	2
33	2
34	2
35	2

[0112] The following scenario demonstrates how the present invention is able to manage changing requirements and process over a period of time. The present invention does this while simultaneously maintaining data integrity, thus allowing the user to obtain information despite the changes that have been made in the data storage structure. The present invention allows all these changes to be made with the solution, which is in continuous use.

[0113] Scenario A

[0114] A shrimp manufacturer has a lab test process (Oxytetracycline Residue Analysis Report) for the shrimp received in the tanks. This process (process prototype **1**) was created and used on 5 Feb. 2003 as shown in a screen shot of a graphical user interface window **500** shown in FIG. **16**.

[0115] Scenario B

[0116] After 1 month of operation the shrimp manufacturer was told by its customer that a Chloramphenical residue analysis test was now needed to in addition to the Oxytetracycline residue analysis test. To add the new test the user makes use of the original process in Scenario 1 (process prototype 1) as a clone to create a new process prototype 2. The user modifies process prototype 1 to create the new prototype while the system is still running This is done by using the existing Oxytetracycline residue analysis test screen as a template to add a new test for the Chloramphenical residue analysis test, see FIGS. **17** and **18**.

[0117] Scenario C

[0118] After three months the shrimp manufacturer was asked again by its customer to add a third test. The new test is a Microbiological analysis test. This was as a direct result of new legislation that had been introduced in the customer's country.

[0119] To do this the user uses the process prototype 2 as clone to create a new process prototype 3, see FIGS. **20-22**. The user modifies the process prototype 2 to create a new prototype while the system is still running This is done by using the existing Oxytetracycline and Chloramphenical residue analysis test as a template screen to create the new Microbiological analysis test

[0120] Tracing

[0121] When the shrimp manufacturer, inspector, or other authorized user wants to do a trace of lab information based on the Tank and Raw Material date, the user keys in the required information into a trace criteria window **600** as shown in FIG. **22**. After the user selects a GO button, a trace is initiated.

[0122] Trace Scenario 1

[0123] When a user enters the following search information in the window **600**:

[0124] Tank Number: TTR-1002

[0125] Raw Material Date: 5 Jun. 2003

[0126] and initiates a trace, the reports that were created for that tank number on the entered date are made available to the user. FIG. **23** shows as window **620** that is presented to the user once the search is complete. The user is presented with links (boxes **624-628**) to the three reports that area available for the entered information. The respective activity reports are obtained by activating the associated link. FIGS. **24-26** are example reports that are displayed upon activation of the corresponding box **624-628**.

[0127] Scenario 2

[0128] When the user enters the following information (as shown in FIG. **27**):

[0129] Tank Number: TTR-1002

[0130] Raw Material Date: **10** Mar. 2003

[0131] and initiates a trace, the reports that were created for that tank number on the entered date are made available to the user. FIG. **28** shows as window **680** that is presented to the user once the search is complete. The user is presented with links (boxes **682**, **686**) to the three reports that area available for the entered information. The respective activity reports are obtained by activating the associated boxes **682**, **686**. FIGS. **29** and **30** are example reports that are displayed upon activation of the corresponding box **682**, **686**.

[0132] FIGS. **31-35** show customized FarmTrace user interfaces that allow a farmer, inspector, or other user to enter farm related information regarding a harvested product. FIG. **31** is a screen shot of a window **700** that lets a user select a Process Prototype. In the window **700**, inspectors or other user creates a set of activities for a farm. This is repeated on a daily basis as necessary. A process prototype clone helps the user to easily create the set of interconnected activities in a single operation.

[0133] As shown in FIG. **32**, farm information has been entered.

[0134] In FIG. **33** Sweet Corn Land Preparation Inspection activities are entered. Land Preparation Inspection activities include other details, such as fertilizer, planting, pesticide details, or any other details desired.

[0135] FIG. **34** shows an entry window for entering Seeding Germination details as wells as other details, such as fertilizer and pesticide details.

[0136] FIG. **35** shows an entry window for entering Growth Development details as wells as other details, such as fertilizer and pesticide details.

[0137] FIG. **36** illustrates a customized user interface for a QualityTrace component of the application. FIG. **36** shows an entry window for entering Received details that include other details, such as previously entered farmer details, sampling information, and detail inspection information.

[0138] FIGS. **37** and **38** illustrate customized user interfaces for a ProductionTrace component of the application. The ProductionTrace component allows entry of information regarding various user specified production activities.

[0139] While the preferred embodiment of the invention has been illustrated and described, as noted above, many changes can be made without departing from the spirit and scope of the invention. Accordingly, the scope of the invention is not limited by the disclosure of the preferred embodiment.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A supply chain management system comprising:

a server including an application program for performing supply chain management;

a database for storing tables created or read by the application program, the database being coupled to the server; and

a plurality of computer-based user systems coupled to the server over at least one of a public or private data network,

wherein the application program includes one or more components from the following list of components:

a first component for storing farming information for a material lot of a product;

a second component for storing quality information for the material lot of the product;

a third component for storing production information for the material lot of the product;

a fourth component for storing shipping information for the material lot of the product; and

a fifth component for retrieving information stored by one or more of the first thru fourth components,

wherein the first through fourth components include fields for entering information to be stored, and wherein deletion, alteration, and addition of the fields is capable of being performed in real or near real-time.

2. The system of claim **1**, wherein the database is distributed across the network.

3. The system of claim **1**, wherein the application program is distributed across multiple servers coupled to the network.

4. The system of claim **1**, wherein the plurality of computer-based user systems include at least one of a wireless hand-held device.

5. The system of claim **1**, wherein material lots and processing stages are defined at run time of the application program within one or more of the components.

6. The system of claim **1**, wherein new processes are defined at run time of the application program within one or more of the components.

7. The system of claim **6**, wherein at least one of attributes or relationship types are defined at run time of the application program within one or more of the components for one or more of the materials or processing stages.

8. A computer program product residing on a computer-readable medium for performing supply chain management, the computer program product comprising one or more components from the following list of components:

a first component for storing farming information for a material lot of a product;

a second component for storing quality information for the material lot of the product;

a third component for storing production information for the material lot of the product;

a fourth component for storing shipping information for the material lot of the product; and

a fifth component for retrieving information stored by one or more of the first thru fourth components,

wherein the first thru fourth components include fields for entering information to be stored, and wherein deletion, alteration, and addition of the fields is capable of being performed by an authorized user in real or near real-time.

9. The computer program product of claim **8**, wherein the computer program product is distributed across multiple servers coupled to the network.

10. The computer program product of claim **8**, wherein material lots and processing stages are defined at run time of the computer program product within one or more of the components.

11. The computer program product of claim **8**, wherein new processes are defined at run time of the computer program product within one or more of the components.

12. The computer program product of claim **11**, wherein at least one of attributes or relationship types are defined at run time of the application program within one or more of the components for one or more of the materials or processing stages.

13. A system for representing a supply chain that changes over time, the method comprising:

a means for creating any number of supply chain stages;

a means for connecting the created supply chain stages in parallel or serial order; and

a means for nesting created supply chain stages to any depth.

14. The system of claim **13**, wherein information associated with the supply chain stages are entered at multiple computer systems that are remote from one another.

15. The system of claim **13**, further comprising:

a means for performing adding, changing, and subtracting of data attributes associated with a supply chain without interfering with other users interaction with the system.

16. The system of claim **13**, further comprising:

a means for performing adding, changing, and subtracting of business processes and relationships based on new business requirements without interfering with other users interaction with the system.

* * * * *