Mobile Agent Development with CBD on ABCD Architectures

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- Related Site
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  - MA Requirements Identification Phase
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  - Component Adaptation
- Example of MA-Specification
- Conclusion
Entering

New Applications
- e.g. Electronic Commerce
- Groupware, Multimedia

Change of Environments

Toward New Age of Software Development

New Software Architecture
- Web-based, Internet
- Distributed Computing

New Development Methodologies
- Object-Oriented, Architecture
  Framework, Componentware

ActiveX
CORBA 2.0
Java
WWW

Server

Clients

New Users
- From Technical
- to Non-Technical Users

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### SW classification (1)

<table>
<thead>
<tr>
<th>용도</th>
<th>응용분야</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embedded SW</td>
<td>Information Access: Cellular Phone, PDA, Vertical Market Devices</td>
</tr>
<tr>
<td></td>
<td>Entertainment: DTV, Set-top Box, MP3 Player, Game Console</td>
</tr>
<tr>
<td></td>
<td>Intelligent Appliances: ATM, POS, Vending Machine, White Goods, Automotive, Medical Monitoring, Intelligent Switches, Telematics, GPS</td>
</tr>
<tr>
<td></td>
<td>Smart Controls: Smart Card, Home Control, Mfg Process Control, AFC</td>
</tr>
<tr>
<td>Information System</td>
<td>Personal IS: PIMS, Office SW</td>
</tr>
<tr>
<td></td>
<td>Enterprise IS: Transaction Processing, Business Intelligence, Enterprise Portal, ERP, CRM, SCM, e-Commerce, KMS, BAM</td>
</tr>
<tr>
<td>Ubiquitous Service</td>
<td>Mobile Service, Digital Home, U-City, U-Health</td>
</tr>
</tbody>
</table>
SW classification (2)

Internet
(PAN, LAN, Local Loop, MAN, WAN)

Server
Computer

PC

Non-PC

Client

Information System

Embedded SW

Ubiquitous Service
SW classification (3)

- **Embedded SW**
  - SW running on ROM inside a device with a CPU
  - SW in a device with a focused set of applications
  - Limited amount of ROM/RAM, electrical power, connection bandwidth, and UI screen
  - Stringent real-time and predictability constraints

- **Information System (Server SW)**
  - SW running on RAM in a server computer
  - SW that performs the business logic
  - SW responding to the request from a client
  - Access to database or data warehouse
  - High throughput and reliability requirements

---

**Ubiquitous Service**

- Sensing
- Analysis / Activity (Portal)
- Service Infra (Hosting Service Center)

---

*Image by Kim Haeng Kon. hangkon@cu.ac.kr*
SW classification (3)

Information System

- Business Component (Biz Logic)
  - EJB
- Web Component (Server-side GUI)
  - Servlet/Servlet/JSP
- Client Component (Client-side GUI)
  - Applet/Swing

Embedded SW

- J2ME Application
  - J2ME Application
  - Car Profile
  - TV Profile
  - PDA Profile
  - Phone Profile
  - Java Card Runtime
- JavaCard Runtime
  - Java Card Applet
  - Java Card Applet
- JCVM
  - JVM

Ubiquitous Service

Memory

CPU
Embedded Software

Requirements and strategy

- Build complex business application quickly
  - Raise software reuse rate
- Build standard interface and middleware
  - Raise interoperability between software
- Make maintenance and repair more easy
  - Regard software as Well-wrapped set of semantic unit
- Build Infrastructure with system-level service
  - Free from a system box => Distributed environment
ES Crisis

Performance based paradigm is sensitive to

- Commercial market
- Cost
- Schedule
- Changing requirements

Software Engineers

Sales, Management,
Quality

Competition
Overcome the Crisis(1)

Shifting of Software Development Methodologies

Model Based Development

CBD

< Hot Topics >

- A collection of rules and guidelines
- A full description of deliverables
- A set of techniques and tools
- A set of appropriate metrics, standards, and test strategies
- A description of the underlying models for product and lifecycle, i.e., process
- Identification of organizational roles, e.g., business analyst, programmer

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Overcome the Crisis(2)

Domain Engineering using CBD

Asset Producer

- Domain Architect
- Component Engineer

Application Producer

Asset Consumer =

- Application Engineer

Application Consumer (End User)

SW Vendor

Framework Development

Design

Component Coding

Framework Assembly

Test

Reusable Assets

Domain Analysis

Domain Scoping

Domain Modeling

Domain Req’ts

Domain Architecture

Asset Reuse

Application Harvest

Build & Assemble
Software Factory

- Manufacturing
  - Parts, Components
Component Base Development (1)

CBD : Component Production + Component Composition

- **Component Base Development (CBD)**: The process of component production and component composition.

**Diagram Description:***

- **Component Architecture**: The overall structure or framework of the component.
- **Component Specification**: The detailed specification of the component.
- **Component Implementation**: The actual code or implementation of the component.
- **Component Module**: The modular parts of the component.
- **Component Reuse Management**: The process of managing and reusing components.
- **Component Publish**: The process of making components available for use.
- **New Application**: The application that references and assembles the components.

**Processes:**

- **Referenced to**: The components are referenced to new applications.
- **Packaged into**: Components are packaged into modules.
- **Realized by**: Components are realized by specific modules.

**Assembled to**: Components are assembled to form new applications.
We sell components

We catalog components

We execute components

We build components

We design components

We identify components

Component Base Development(2)
Component Base Development(4)

Use of Component

Implementation Specific Components

Models

Class Libraries

Used to specify or build components

Individual Components

- Service based
- Replacable
- Independent
- Identifiable
- Accessed via Interfaces

Component Framework

Collections of components designed to be extended

Componentised Application

Application comprised of components
Component Base Development(5)

CBD Process

Domain Analysis → Domain Design → Component Extraction → Component Design → Component Implementation

Component Classification
Component Configuration Manager
Component Retrieval/Explanation
Component Design Pattern
Component Repository

Component Distribution

Component Customization
CBD Design Process
Application Requirement

For Reuse Process

New Application
Component Architecture For Korea Component Consortium

- Component Base Development (6)
Component Base Development(7)

Component Diagrams with UML

Source: Rational Software
Component Base Development(9)

Analysis
- Class Modeling
- State Transition
- Sequence Diagram
- Activity Diagram

Requirements Definition
- Use Case Modeling
- Class Modeling

Design
- Packaging
- Component Diagram
- Deployment Diagram

Source: Butler Group
Component Base Development (10)

- Scenario Component Layer
- Port based Tailoring
- Composite Component Layer
- Feature Composition Tailoring
- Elementary Component Layer

Component integration
Component Base Development (11)

- Monolithic Component
  - Monolithic
  - Completed
Component Base Development (12)

Component Integration (3)

SC

Scenario Component

Business Process

Composited Component takes a role from both

CC1

Composite Component

E1

Role A

CC2

Composite Component

E1

Role B

Basic, Common Logic

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Related Site

- http://selab.cataegu.ac.kr/
- http://www.cetus-links.org/
- http://www.cbdiforum.com/
- http://www.componentsource.com/
- http://www.flashline.com/
- http://alsp.ie.org/alsp/
- http://bmdssc.jntf.osd.mil
- http://www.disa.mil/
Related Site

http://www.componentsource.com/

ComponentSource offers a unique global service, used by over 1,000,000 software developers worldwide.
Case Works – Kinds of Agent

- Some key applications for agents in internet
  - Information Gathering Agents (interesting in our work)
  - Shopping Agent
  - Management Agent
  - Monitor Agent
  - Mobile Agent (interesting in our work)
Case Works
- Some of key problems in using Agents

- Security
- Psychological Resistance
- Infrastructure Integration
- Interoperability
- Reliability
Case Works – Agent Model

- Agent Concept Model
  - atomic autonomous entity
  - gives an informal agent-centric overview of how these concepts are inter-related
In order to construct component reference architecture, agent is classified in general agent type and e-business function attribute.

Reference architecture

- Consisted of two part, which has 14 general types and 11 concrete business agent types with domain oriented component architecture.
- Two classification areas:
  - Tend to be independent for each cross-referenced
  - Each area has its own horizontal and vertical characteristics
- General agent types are corresponding to agent platform and application
- Possible to develop agent system or application by the referencing architecture
Component development process based architecture

- Involve the development of component from MA specification by using UML model

- Consider systemically development process using AUML and MA model technology to analyze, design, and develop e-business agent

Product

- Domain analysis specification, design model, implemented component
- Stored in the repository
MA-CBD Process
- Process

**ebA Requirements Identification**
- User/Domain Requirement Identification
- Use Case Identification
- Use Case Description

**ebA Specification Development**
- ebA Identification /Role Model Creation
- ebA Goal Model Creation
- ebA Interaction Model Creation
- ebA Architecture Model Creation
- ebA Spec. Description

**ebA-CBD Specification Development**
- e-Business Concept Model
- e-Business Static Model
- e-Business Interface Identification
- Component Spec. Description/Architecture

**Component Adaptation**
- Provision
- Assemble
- Test
- Deployment
MA-CBD Process
- MA Requirements Identification Phase

- The requirement of agent
  - Identified in desired business system
  - To analyze the primary property of agent
  - Corresponding to agent type in reference architecture and what business concept is focused on

- For the e-business domain analysis
  - Used UML’s use case diagram
  - Supports the behavior of a system by modeling static aspects of a system
  - Presented on entire domain concept and scenario using activity diagram
  - Defined through use case diagram and use case description.
MA-CBD Process
- MA Specification Development(1)

- Agent specification
  - based on user’s requirement creates MA Specification and 4 models
  - identify and development new components.

- MA Model
  - extends the UML meta-model by adding a number of elements
  - Represent the notation that MA-Role, Goal, Interaction and Architecture model
  - graphically the instances of these new meta-elements in the diagrams
MA Model Notation

- Representing the MA Model concepts and relations

**MA Model Notation**

- Agent
- Goal
- Role
- Task
- Business Actor
- Agent Area
- Interaction
- Assignment
- Implication
- Data flow
The usages of relationships

- **Implication**
  - Links one or more elements that have an attribute of type state to a single element that has an attribute of type state

- **Assignment**
  - Links an element of type Autonomous Entity to an element that has an attribute of type Autonomous Entity
  - Assignment from one Autonomous Entity to another following the direction of the arrow

- **Data flow**
  - Links a DataProsumer to an InformationEntity that is produced or consumed
  - Relation as the ObjectFlow relation defined in UML
MA-CBD Process
- MA Specification Development(4)

- MA Identification and Role Model Creation
  - focuses on the individual Agents and Roles

  - For each agent/role it uses scheme supported by diagrams to its characteristics
    - what goals it is responsible for
    - what events it needs to sense
    - what resources it controls
    - what tasks it informs
    - how to perform
- MA-CBD Process
  - MA Specification Development(5)

**MA-CBD reference metrics**

- Used to agent identification and agent naming
- To give a classification code

<table>
<thead>
<tr>
<th>Agent Type</th>
<th>E-Business Agent</th>
<th>System-Level Agent(00)</th>
<th>General Business Activity Agent(10)</th>
<th>Personal Agent(20)</th>
<th>System-Level Agent(30)</th>
<th>Security Agent(40)</th>
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<td>Software Agent(SWA)</td>
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<td>Adaptive Agent (ADA)</td>
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<td>Mobile Agent (MBA)</td>
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<tr>
<td>Coordinative Agent (COA)</td>
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<td>Intelligent Agent (ITA)</td>
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<td>Interface Agent (IFA)</td>
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<tr>
<td>Information Agent (IMA)</td>
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<td>Smart Agent (SMA)</td>
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<td>Heterogeneous Agent (HGA)</td>
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</tr>
</tbody>
</table>
MA-CBD Process
- MA Specification Development(6)

- MA Goal Model Creation
  - Shows Goals, Tasks, States and the dependencies among them
  - Linked by logical dependencies to form graphs
    - Show that achieving a set of sub-goals implies that a higher level Goal is achieved
    - How Tasks can be performed to achieve Goals

- MA Interaction Model Creation
  - Highlights which, why and when agents/roles need to communicate leaving all the details about how the communication takes place to the design process
  - Can be conveniently expressed by means of a number of interaction diagrams
  - Shows the initiator, the responders, the motivator of an interaction plus other optional information
MA Architecture Model Creation

- Shows agents relationship to negotiate and coordinate in agent area
- Considers the business actor and domain concept

Agent area

- software agents meet and interact in the target architecture
- Can be distributed on different hosts, and facilitate means for efficient inter-agent communication

- two main types
  - the area where the agents advertise their capabilities, communicate with other agents
  - the user-client where the user interacts with agents
MA Specification Description

- Based previous models as role model, goal model, interaction model and architecture model
- Show functional and non-functional elements
  - Functional element: described to use class diagram and sequence diagram

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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<tbody>
<tr>
<td>Agent Name</td>
<td>Identified eB A name</td>
</tr>
<tr>
<td>E-Business Type</td>
<td>Identified E-business Type in eB A-CBD reference architecture</td>
</tr>
<tr>
<td>General Agent Type</td>
<td>Identified General Agent Type in eB A-CBD reference architecture</td>
</tr>
<tr>
<td>Identification Code</td>
<td>Identified code in eB A-CBD metrics</td>
</tr>
<tr>
<td>Access Information</td>
<td>Assessed, stored and modified information</td>
</tr>
<tr>
<td>Produce Information</td>
<td>File/information which the agent creates while it operates</td>
</tr>
<tr>
<td>Related Agent</td>
<td>Agent which negotiate, coordinate or exchange message</td>
</tr>
<tr>
<td>Information Model</td>
<td>Represented agent’s attribute and operation</td>
</tr>
<tr>
<td>Operation Model</td>
<td>Represented sequence of operation among agents</td>
</tr>
</tbody>
</table>
MA-CBD Process
- MA-CBD Specification Development(1)

Input

- Requirements a use case model, MA models, MA-spec
- Uses information about existing software assets
  - Legacy systems, packages, and databases
  - Technical constrains, such as use of particular architectures or tools

Output

- Set of component specifications and component architecture
- Component specification
  - Include the interface specifications they support or depend on
- Component architecture
  - Shows how the components interact with each other
  - Must be provided in specification form for integration
MA-CBD Process
- MA-CBD Specification Development(2)

- Component Specification
  - Include component design and development information, functional and non-functional information and commercial information

<table>
<thead>
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<th>Item</th>
<th>Description</th>
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<tbody>
<tr>
<td>Category</td>
<td>Component family of Business domain</td>
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<tr>
<td>Component Diagram</td>
<td>Relationship between component</td>
</tr>
<tr>
<td>Component Name</td>
<td>Identified component name</td>
</tr>
<tr>
<td>Classification Code</td>
<td>Classification code of component based on ABCD Architecture</td>
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<tr>
<td>Short Description</td>
<td>Describe about component function, motive, constraint, etc.</td>
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<tr>
<td>Glossary</td>
<td>Describe concept of glossary related component specification</td>
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<tr>
<td>Component Context Diagram</td>
<td>Main function of Component</td>
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<tr>
<td>Component Interaction Diagram</td>
<td>Relationship between component</td>
</tr>
<tr>
<td>Component Sequence Diagram</td>
<td>Operational sequence of component</td>
</tr>
<tr>
<td>Component Diagram</td>
<td>Represent of required and provide interface</td>
</tr>
<tr>
<td>Component State Diagram</td>
<td>Represent of operation change</td>
</tr>
<tr>
<td>Interface Description</td>
<td>Pre/Post condition, input/output result</td>
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<tr>
<td>Usage Scenario</td>
<td>Scenario for component usage</td>
</tr>
<tr>
<td>Quality Attribute</td>
<td>Non-functional(Quality) attribute</td>
</tr>
</tbody>
</table>
MA-CBD Process
- Component Adaptation

- Provisioning phase
  - To determine what components to build or buy, in the assembly phase as an input to test scripts
  - Ensures that the necessary components are made available,
    - By building them from scratch
    - By buying them from a third party
    - By reusing, integrating, mining
    - By modifying an existing component or other software
  - Includes unit testing the component prior to assembly

- Assembly phase
  - Takes all the components
  - Puts them together with existing software assets and a suitable user interface

- The application is passed to the test phase for system and user acceptance testing
Reference Architecture of MA-CBD

- MA-CBD Reference Architecture

![Diagram of MA-CBD Reference Architecture]

- General Type
- Component for e-biz Agent

<table>
<thead>
<tr>
<th>Business Type</th>
<th>Component</th>
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<tbody>
<tr>
<td>Security Agent</td>
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<tr>
<td>Application Agent</td>
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<tr>
<td>Personal Agent</td>
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<tr>
<td>Information Brokering Agent</td>
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<td>Negotiation &amp; Contracting Agent</td>
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<td>Financial Agent</td>
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<td>Legal Agent</td>
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<td>Adaptive Agent</td>
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<td>Mobile Agent</td>
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<td>Coordinative Agent</td>
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<td>Wrapper Agent</td>
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<td>Information Agent</td>
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<td>Smart Agent</td>
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<tr>
<td>Hybrid Agent</td>
<td></td>
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<tr>
<td>Heterogeneous Agent</td>
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</table>
MA-CBD Integration

- Component Integration

**Business Process**

Composited Component takes a role from both

Basic, Common Logic
Example of MA-Specification (1)

- **Example : Component information search agent**
  - The agent finds the information of the component to be registered newly

- **MA Requirements Identification**
  - Use case diagram of Component Information Search Agent
Example of MA-Specification(2)

- **MA-Spec. Development**
  - The MA candidate is identified based on use case diagram and using MA-CBD reference metrics
  - Identified MA: User, Search, and collection agent

<table>
<thead>
<tr>
<th>Agent Type</th>
<th>General Business Activity Agent(10)</th>
<th>Personal Agent (20)</th>
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<tbody>
<tr>
<td>E-Business Agent</td>
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<tr>
<td>Mobile Agent (MBA)</td>
<td>Information Brokering Agent (15)</td>
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<tr>
<td>Coordinative Agent (COA)</td>
<td>MBA-20-01 Collection Agent</td>
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<tr>
<td>Intelligent Agent (ITA)</td>
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<tr>
<td>Wrapper Agent (WRA)</td>
<td>IFA-20-01 User Agent</td>
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<td>Middle Agent (MOA)</td>
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<tr>
<td>Interface Agent (IFA)</td>
<td>IMA-15-01 Search Agent</td>
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<tr>
<td>Information Agent (IMA)</td>
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</tbody>
</table>
Example of MA-Specification(3)

- **Role Model**
  - Represents overall role of component information search agent
  - Describe the external characteristics of identified agent

![Diagram of Role Model]
Goal model

- Shows the main goal of the component information search agent
- The CreateNewList goal is achieved when lower goal successfully completed

```
provide
new component
information list

create
new list

search
new component

gather
component
information

gather
component
information

notified of user's
log file change
```
Example of MA-Specification(5)

- Interaction model
  - Describing the InformationRequest interaction between the Component Information Gather and Component Information Assistant roles
Example of MA-Specification(6)

- Architecture model
  - Represents overall system structure of Component Information Search Agent
    - Search Agent finds the information of the component to be registered newly
    - Collection Agent periodically update and gather to component information list
    - User Agent provide to alert service and manage log file
Example of MA-Specification(7)

- User Agent specifications
  - The information and operation model provide inter/external structure and interoperation of agents

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Agent Name</td>
<td>User Agent</td>
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<tr>
<td>E-Business Type</td>
<td>Personal Agent</td>
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<td>General Agent Type</td>
<td>Interface Agent</td>
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<td>Identification Code</td>
<td>IFA-20.01</td>
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<tr>
<td>Access Information</td>
<td>User Id, User Login Time, Logout Time</td>
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<tr>
<td>Produce Information</td>
<td>User Log File</td>
</tr>
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**Information Model**

**Operation Model**

**Related Agent**

**Collection Agent**
Example of MA-Specification(9)

- Operation Model

```
<table>
<thead>
<tr>
<th>: Site Manager : Seller : User</th>
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<tbody>
<tr>
<td>Product Registration</td>
</tr>
<tr>
<td>Product_Info, Check</td>
</tr>
<tr>
<td>Collection</td>
</tr>
<tr>
<td>Update Collection List</td>
</tr>
<tr>
<td>Send Mail</td>
</tr>
<tr>
<td>Mail Address Check</td>
</tr>
<tr>
<td>User Concern Check</td>
</tr>
<tr>
<td>Check of Concern in Collection List</td>
</tr>
<tr>
<td>Mail Contents Creation</td>
</tr>
<tr>
<td>Delete Collection List</td>
</tr>
</tbody>
</table>
```
Example of MA-Specification (10)

- Static Model

- e-Commerce Product Information Mailing Agent
  - mAillingTime
  - isAcquaintedWith

- Product
  - Name: String
  - Price: Integer
  - Maker: String
  - Origin: String
  - Product_Code: Integer
  - Stock: Integer
  - Classification_Code: Integer
  - Registration_Date: Date
  - Image: String
  - registration
  - search

- Collector_Agent
  - Item: String
  - Date: Date
  - DBFile: Byte
  - File: Byte
  - Time: Time
  - Update_NewProductList

- Site_Manager
  - Name
  - Telephone
  - E-Mail

- Sellers
  - Name
  - Telephone
  - E-Mail

- Database
  - NewProductList

- Mailing_Agent
  - E-Mail: String
  - Item: String
  - DBFile: Byte
  - File: Byte
  - Time: Time
  - Create_MailContents
  - Send_Mail
  - Delete_Collection_List
  - Check_User
  - Check_Collection_List

- User
  - Name
  - Item
  - Check_MailAddress
  - Check_Concern

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Example of MA-Specification(11)

- Collaboration Diagram
  - Represents interaction between classes for e-CPIMAS

```
5: Update Collection List

Collector_Agent : e-Commerce
Product Information Mailing Agent

4: Collection

3: Product_Info, Check

1: Product_Registration

: Site_Manager

2: Product_Registration

Products : e-Commerce Product
Information Mailing Agent

6: Mail Address Check
7: User Concern Check
8: Check of Concern in Collection List
9: Mail Contents Creation
11: Delete Collection List

Mailing_Agent : e-Commerce Product
Information Mailing Agent

10: Send Mail

: User

: Sellers
```
Example of MA-Specification(12)

- e-Mailing Agent interface Model
Example of MA-Specification(13)

- Component Diagram

```
DB_Component

IMailContents

Mailing_Component

IMailContents

Collection_Component

INewProductList

ICollectionTime

IEmailingTime
```

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## Example of MA-Specification(14)

### MA-CBD Specification for Mailing Component

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category</td>
<td>E-Business Agent</td>
</tr>
<tr>
<td>Component Diagram</td>
<td><img src="image" alt="Component Diagram" /></td>
</tr>
<tr>
<td>Component Name</td>
<td>Mailing Component</td>
</tr>
<tr>
<td>Classification Code</td>
<td>MA.00.01.01</td>
</tr>
<tr>
<td>Short Description</td>
<td>get information form DB and send the mail to the user</td>
</tr>
</tbody>
</table>
| Interface Description | Mailling_Component :
                          [Provide Interface : ImailContents ]
                          [Provide Interface : IUserMailContents ]
                          [Provide Interface : ICollectionTime]
                          
                          DB_Component :
                          [Required Interface : IUserMailContents ]
                          [Required : ICollectionTime] |
Example of MA-Specification (15)

- E-CPIMAS System Structure
  - Component structure based on .net Framework
Example of MA-Specification(16)

- Product Registration Window

![Product Registration Window]

- Code: 10
- Date: 2003-5-1 0:9:9
- Name: Fuji FinePix F410
- Price: 500000
- Maker: Fujifilm
- Origin: Japan
- Stock: 4
- Category: Digital Camera

Image: 4th Generation CCD

Buttons: Registration(R), Search(S), Quit(Q)
Example of MA-Specification(17)

- Product information collection window of Collection Agent
Example of MA-Specification(18)

- Execution Window of Mailing Agent

![Mailing Agent Window](image1.png)

```
<td width="100" height="100">
  <img border="0"
  src=http://203.250.32.94/ema/image/computer1.jpg width="90"
  height="90">
</td>
```

![Mailing Agent Window](image2.png)

```
<td width="100" height="100">
  <img border="0"
  src=http://203.250.32.94/ema/image/computer2.jpg width="90"
  height="90">
</td>
```

![Mailing Agent Window](image3.png)

```
<td width="100" height="100">
  <img border="0"
  src=http://203.250.32.94/ema/image/computer3.jpg width="90"
  height="90">
</td>
```

![Mailing Agent Window](image4.png)

```
<td width="100" height="100">
  <img border="0"
  src=http://203.250.32.94/ema/image/computer4.jpg width="90"
  height="90">
</td>
```
Example of MA-Specification(19)

- Window of Product Information Mail

새로나온 상품 리스트입니다.

<table>
<thead>
<tr>
<th>제품명</th>
<th>Compaq D320 4700048-327</th>
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<tr>
<td>제조사</td>
<td>Compaq</td>
</tr>
<tr>
<td>가격</td>
<td>1000000</td>
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</table>

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<tbody>
<tr>
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<td>가격</td>
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<th>삼성 매직스테이션 MZ20-RW26P/24A</th>
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</thead>
<tbody>
<tr>
<td>제조사</td>
<td>삼성전자</td>
</tr>
</tbody>
</table>
Conclusion

- Each characteristic in the view of agent and component are defined

- MA-CBD process
  - Proposed to develop e-business agent
  - Defining MA specification of whole entire agent has e-business agent information more systemical and intuitional then also includes more information

- Introducing the systemical process and MA-CBD reference model of e-business agent can provide the efficiency by the component easily

- The specification can be the guideline to choose desired component and be reused as based more for component creation
Future Works

- The definition and detail methods should be required based on MA specification for component development and assemble.

- The comparison and verification are needed though the cases study of implementation.

Thank you!