

1.

1.1

(Trading Service) 가

가

(attribute) 가 . ODP [2]

(Importer) 가 (Exporter)

(attribute base)

(Directory Service) [3] 가 (White Page Service)

(Yellow Page Service)

OSF DCE (Open Software Foundation Distributed Computing Environment) [28], OMG CORBA (Object Management Group Common Object Request Broker Architecture) [4]

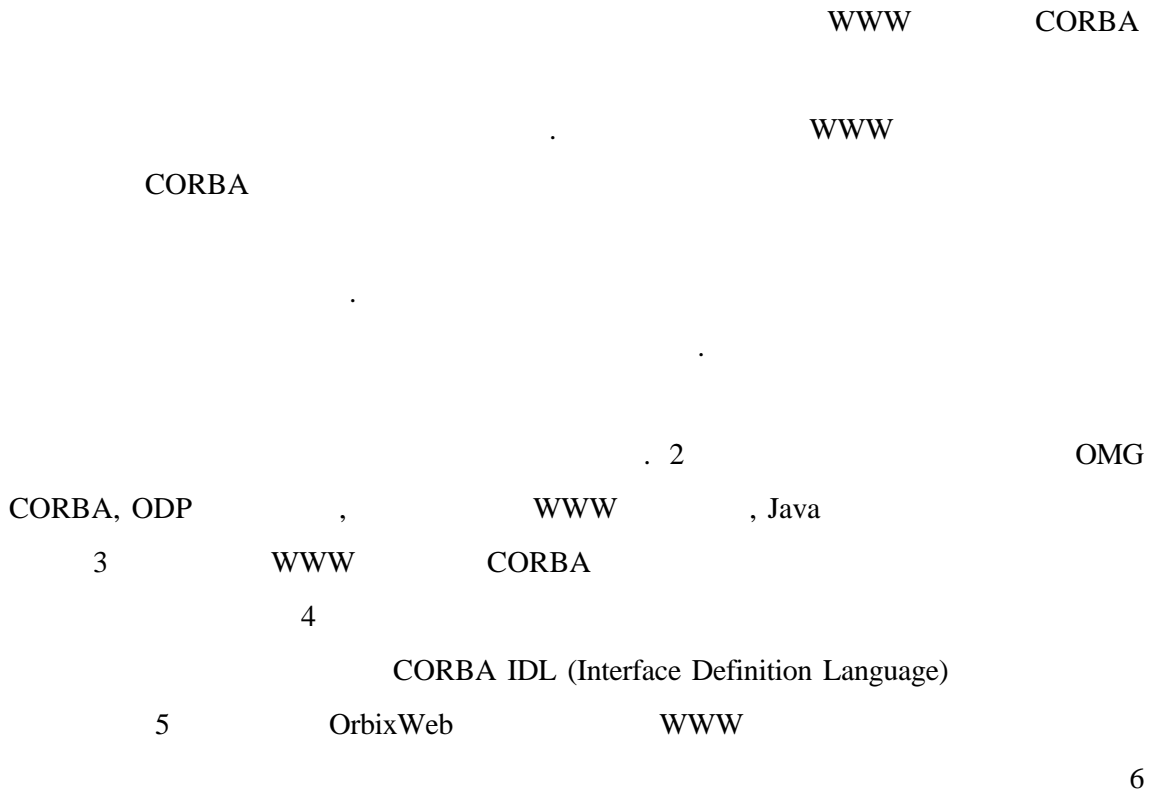
, CORBA 가

WWW [16]

가

가

가



2.

WWW CORBA
OMG CORBA, ODP , WWW , Java

2.1 OMG CORBA

IIOP (Internet Inter-ORB
Protocol) [4] 가

OMG CORBA [4] . OMA CORBA

2.1.1 OMA

OMG , (Interoperability),
(Portability)

OMA
(Object Management Architecture) [18] . OMG OMA 1

✍️ ORB (Object Request Broker):

. ORB

. ORB

✍️

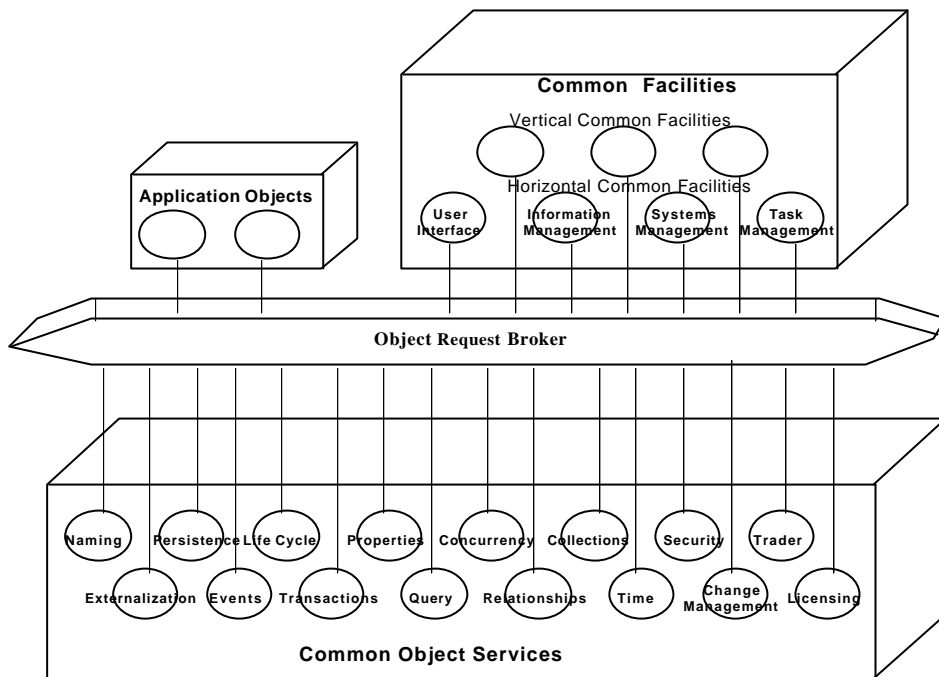
✍️ OS (Object Services):

✍️

✍️ CF (Common Facilities):

✍️

✍️ AO (Application Objects):



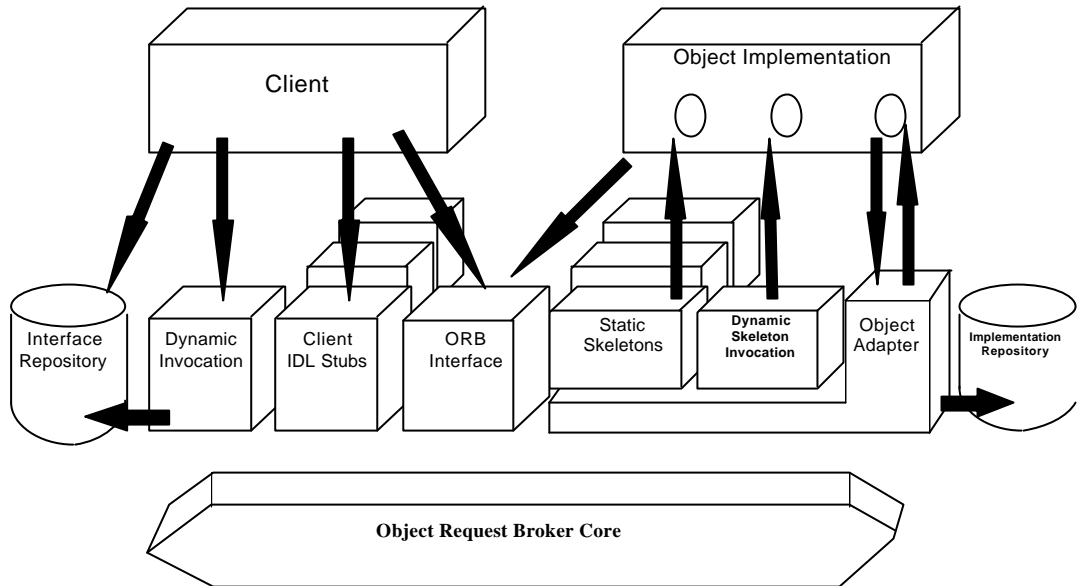
1. The OMG Object Management Architecture

CORBA (heterogeneous)

OMG 가

2.1.2 CORBA

2 CORBA 2.0 [4] . CORBA



2. CORBA 2.0

ORB (Object Request Broker): ORB

(heterogeneous)

가

가

가

✍

✍

IDL :

✍

DII (Dynamic Invocation Interface):

✍

☞☞ : (run-time database) IDL
가 .

☞

☞☞ ORB :
API .

☞

☞☞ IDL (skeleton) :
. IDL .

☞

☞☞ DSI (Dynamic Skeleton Interface) :

.

☞

☞☞ :
. CORBA BOA (Basic Object Adapter)

.

☞

☞☞ (Implementation Repository): 가 ,
, ID [4,
19].

2.2 ODP

[2]

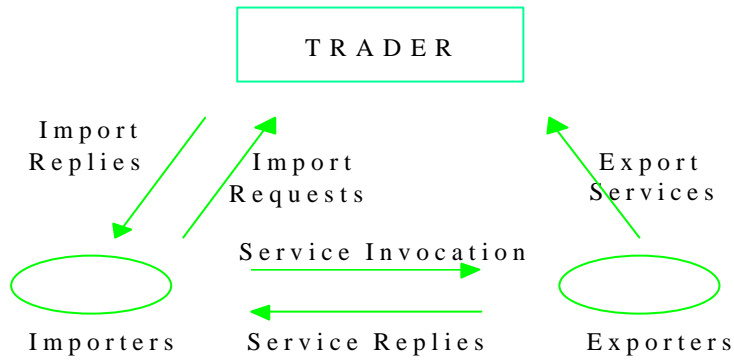
2.2.1

(Trader) [2]

가

3

3



3. Trader and Its Users

ODP

(Importer),

(Exporter),

4 가

(Service Provider)

가

(withdraw)

ODP

가

가

가

ODP [1]

가

(service offer)

ODP

2.2.2 DCE ODP

CRC for Distributed Systems Technology

DCE

[11].

ODP

ODP

. DCE

가

가

2.2.3 TRADEr

TRADEr [12]

DCE

. TRADEr

가

(Service Offer Manager),

(Service

Selection Manager),

(Access Control Manager),

(Trader Interworking Manager),

(Type Manager)

. TRADEr

RPC (authenticated remote procedure call)

DCE

RPC

2.3

WWW

WWW CORBA
WWW

2.3.1

OSF DCE [28] OMG CORBA [4] WWW
[7].

~~WWW~~

~~WWW~~

~~WWW~~ WWW 가

WWW

2.3.2 DCE-Web

DCE-Web [8], HTTP DCE-Web DCE
RPC (protocol tunneling)
HTTP

DCE 가 DCE

DCE

2.3.3 Web*

Web* [9] Orbix CORBA DII
 (Dynamic Invocation Interface) Tcl . Web*
 WWW 가 CGI Tcl (Tool Command Language)
 CORBA Tcl CORBA DII
 가 TclDii . Tcl Orbix NCSA
 CERN CGI .
 Web* Orbix [13]
 WWW .

2.3.4 ANSA Web

APM (Architecture Projects Management Ltd.) WWW CORBA [10]
 . CORBA
 HTTP WWW CORBA
 . ANSA Web CORBA (wrapper) URL
 CORBA . ANSA Web CORBA/HTTP
 CORBA HTML CORBA
 가 . CORBA
 CORBA 가 WWW .

2.3.5 Java ORB

Java ORB [25] OMG IDL Java
 CORBA 가
 .
 CORBA . Java ORB

Visigenic Black Widow [29], Sun JOE (Java Object Environment) [30], Iona
OrbixWeb [14] .

2.3.6 Netscape ONE

Netscape ONE (Open Network Environment) [26] HTTP (HyperText Transfer Protocol), HTML (HyperText Markup Language), LDAP (Lightweight Directory Access Protocol) [31], Java

. Netscape ONE IIOP (Internet Inter-ORB Protocol) [4]
(distributed object model) . Netscape Communication
Corporation IIOP ORB .
Netscape ONE CORBA 2.0 [4]

2.4 Java

Java
가 [15, 27].

~~Java~~ . Java
가
. Java .

~~Java~~
~~Java~~ . Java C++

✍

✍✍ Java . Java C++

✍

✍✍ Java . Java

✍

✍✍ Java

✍

✍✍ Java

3. WWW CORBA

WWW CORBA

WWW-CORBA

3.1

WWW 4

WWW

WWW, WWW, CORBA, WWW-CORBA, (SUO, Service User Objects), (SPO, Service Provider Objects) ORB

, SUO, SPO CORBA

. WWW WWW

CORBA Java CGI

[23] WWW-CORBA

WWW CORBA CORBA

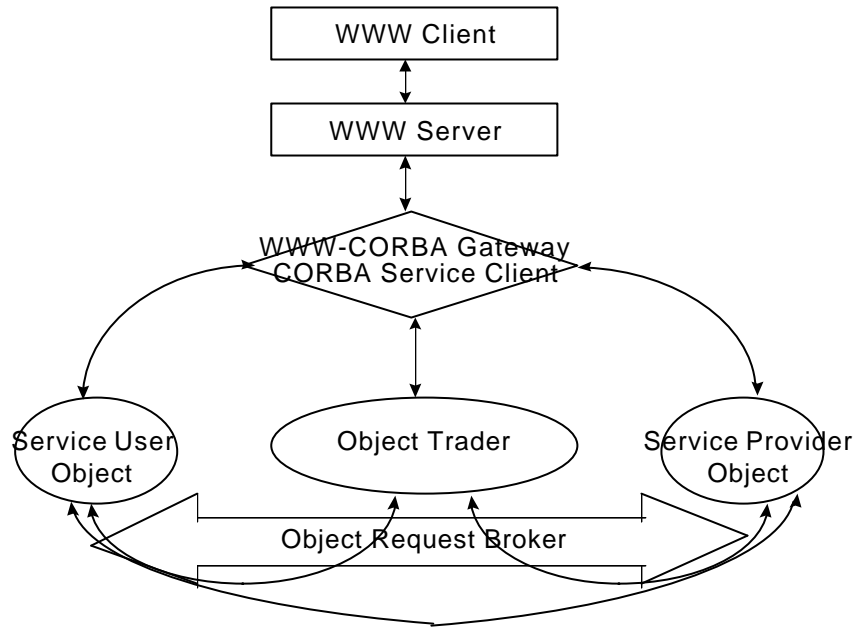
CORBA

WWW-CORBA CORBA CORBA

WWW 가 CORBA CORBA

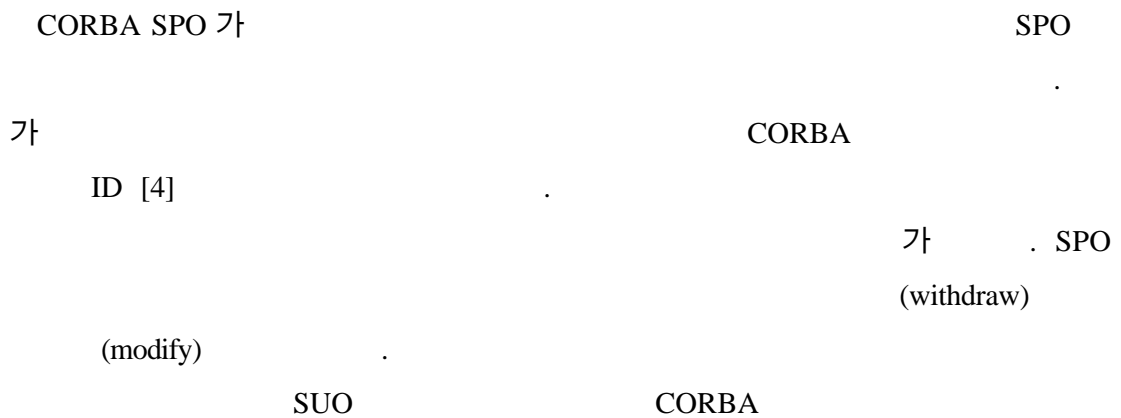
CORBA

. SUO SPO



4. Object Trader Service in WWW

3.2



WWW (matching constraint)

. CORBA SUO

WWW-CORBA . SUO 가

SUO SPO .

SUO SPO

SPO . SUO SPO

가

CORBA CORBA

WWW

WWW-CORBA .

CORBA CORBA

WWW .

CORBA 가 SUO SPO

가 CORBA DII [4]

SPO SPO

. CORBA SUO

WWW SPO

CORBA Java CGI

CORBA CORBA

WWW

.

3.3

GIOP (General Inter-ORB Protocol) [4, 18] ORB
. GIOP ORB ORB
. IIOP (Internet Inter-ORB Protocol) GIOP 가
TCP/IP ORB
. GIOP IOR (Interoperable
Object Reference) [4, 18] ORB
가 ORB IOR .
CORBA 가
ORB 가 . ORB
CORBA
가 ORB .
, IOR [4]
IOR CORBA ORB
SUO SPO 가 ORB
SUO IOR SPO . IIOP [4]
SUO SPO 가 ORB
가 .
IOR CORBA IIOP

3.4 WWW-CORBA

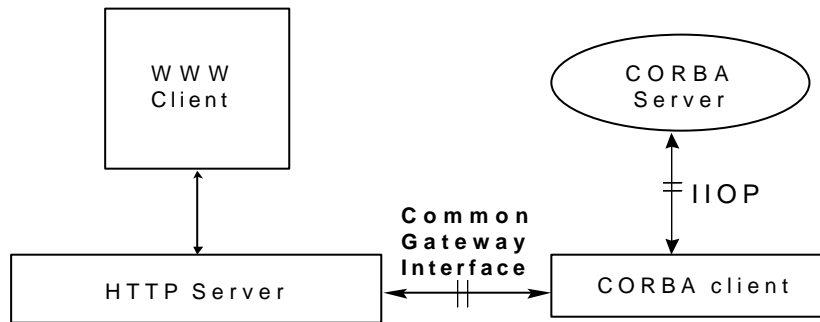
WWW-CORBA CGI [23]
Java ORB [22] .

3.4.1 CGI

CGI (Common Gateway Interface) [23]

가

. CGI
 . CGI CORBA
 5
 [21].



5. CGI-based Integration

CGI

가 CORBA

. CORBA

가 CGI

. HTML

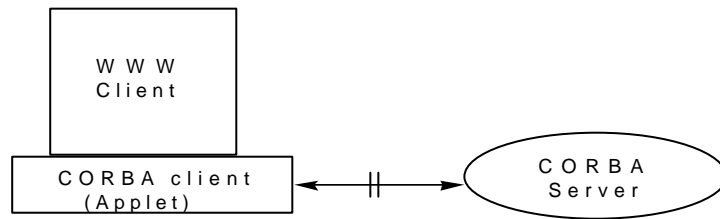
WWW

가

가

3.4.2 Java ORB

Java ORB
WWW 가 Java http
Java
ORB (miniature ORB)
CORBA
CORBA [22].



6. Java ORB

4.

(Object Trader

Service Specification)

OMG RFP5 (Object Service Request For Proposal 5) [6]
1995 CORBA (CORBA service specification)

ISO 가 CORBA
IDL CORBA IDL
[2, 5].

1995 6 ISO “Final Draft -ISO/IEC DIS 13235 - ODP Trading
Function” [5]

가 CORBA
ORB CORBA

Hewlett-Packard, BNR, DSTC
(submission) [32] “Final Draft -ISO/IEC DIS 13235”,

ORB CORBA
IOR [4] IIOP [4]

CORBA

ID [4]

가 가

IDL

4.1

4.1.1 (Properties)

<name, value>

가

[5].

```
struct Property {  
    string name;  
    any value;  
};
```

```
typedef sequence<Property> PropertyList;  
typedef sequence<string> PropertyNameList;
```

```
Property <name, value> value  
가 . PropertyList Property
```

4.1.2 (Service Offer)

가

.

가

.

[5].

```
struct Offer {  
    Object reference;  
    PropertyList properties;  
};  
  
typedef sequence<Offer> OfferList;  
typedef sequence<Object> ObjectList;
```

Offer *reference* IOR [4]
properties .

CORBA 가

ORB

ORB

IOR [4]

CORBA

IIOP [4]

가

가

IOR

IOR

가

4.1.3

```

struct Record {
    string repository_id;
    OfferList objects;
};

typedef sequence<Record> Database;

```

objects CORBA
 ID Record . CORBA
 (Interface Repository) [4]
 IDL 가 .
 가 ,
 (attribute) ,
 가 ID (RepositoryId)
 , , , , ,
 . CORBA 2.0 ID 가 ID
 [4, 18].
 (context)

[2]

ID

Database

가

4.2

가

4.2.1 (Constraint Language)

(matching constraint)

[5].

typedef string Constraint;

boolean, short, unsigned short, long, unsigned long, float, double,
char, string (sequence)

~~///~~ ::= (), != (), > (~), >= (~),

< (~), <= (~), ~ ()

~~///~~ : && (and), || (or), ! (not)

~~///~~ : +, -, *, /

C

4.2.2 (Preferences)

가

```
typedef string Preference;
```

first, random, max, min 4 가

~~del~~ **first:**

~~del~~ **random:**

~~del~~ **max:**

~~del~~ **min:**

4.2.3 (Policies)

<name, value>

```
struct Policy {  
    string name;  
    any value;  
};  
typedef sequence<Policy> PolicyList;
```

~~del~~ **def_no_o_s** (Default Number of Offers to be Searched): no_o_s

~~del~~

~~del~~ **max_no_o_s** (Maximum Number of Offers to be Searched):

~~☒~~

~~☒☒~~ **no_o_s** (Number of Offers to be Searched):

max_no_o_s

~~☒~~

~~☒☒~~ **def_no_return** (Default Number of Offers to be Returned): no_return

~~☒~~

~~☒~~

~~☒☒~~ **max_no_return** (Maximum Number of Offers to be Returned):

~~☒~~

~~☒☒~~ **no_return** (Number of Offers to be Returned):

max_no_return

~~☒~~

~~☒☒~~ **def_l_l** (Default Number of Link Level): l_l

~~☒~~

~~☒☒~~ **max_l_l** (Maximum Number of Link Level):

~~☒~~

~~☒☒~~ **l_l** (Number of Link Level):

max_l_l

~~☒~~

~~☒☒~~ **def_s_t** (Default Search Time): s_t

✍

✍✍ **max_s_t** (Maximum Search Time):

✍

✍✍ **s_t** (Search Time):

max_s_t

4.3 (Importer and Exporter)

Export, Withdraw, Modify, Describe
Import 가 [5].
Registry

4.3.1 (Exceptions)

```
exception DuplicatedObjectRef {  
    Object reference;  
};
```

가

```
exception IllegalObjectRef {  
    Object reference;  
};
```

IOR

```
exception ObjectNotRegistered {  
    Object reference;  
};
```

가

```
exception IllegalPropertyName {  
    string name;  
};
```

```
exception IllegalRepID {  
    string repository_id;  
};
```

ID

```
exception RepIDNotRegistered {
```

```
    string repository_id;  
};
```

ID 가

```
exception IllegalPreference {  
    Preference Pref;  
};
```

가

```
exception IllegalPolicyName {  
    string name;  
};
```

4.3.2 Export

Export

[5].

```
void export (  
    in Object reference,  
    in string repository_id,  
    in PropertyList list  
) raises (  
    DuplicatedObjectRef,  
    IllegalObjectRef,  
    IllegalPropertyName,  
    IllegalRepID  
);
```

ID, . 가
DuplicatedObjectRef
 , , ID 가
IllegalObjectRef, IllegalPropertyName, IllegalRepID .

4.3.3 Withdraw

Withdraw .
 [5].

```
void withdraw (
    in Object reference,
    in string repository_id
) raises (
    ObjectNotRegistered,
    IllegalObjectRef,
    IllegalRepID,
    RepIDNotRegistered
);
```

ID
 가
ObjectNotRegistered 가 ,
 ID 가 *IllegalObjectRef, IllegalRepID* 가
 ID 가
RepIDNotRegistered 가 .

4.3.4 Modify

Modify
가
가
가
[5].

```
void modify (  
    in Object reference,  
    in string repository_id,  
    in PropertyList list  
) raises (  
    IllegalObjectRef,  
    IllegalPropertyName,  
    ObjectNotRegistered,  
    IllegalRepID,  
    RepIDNotRegistered  
);
```

ID

가
ObjectNotRegistered 가
ID 가
IllegalObjectRef, IllegalPropertyName, IllegalRepID 가
ID 가 RepIDNotRegistered 가

4.3.5 Describe

Describe [5].

```
Offer describe (  
    in Object reference,  
    in string repository_id,  
    in PropertyList list  
)
```



```

        in Object reference,
        in string repository_id
    ) raises (
        ObjectNotRegistered,
        IllegalObjectRef,
        IllegalRepID,
        RepIDNotRegistered
    );

```

```

        ID
        ID ,
        가
        가
        가
        ObjectNotRegistered 가
        ID 가
        IllegalObjectRef, IllegalRepID 가
        ID 가 RepIDNotRegistered 가

```

4.3.6 Browse

Browse

```
OfferList browse ( );
```

```
browse ( )
```

가

4.3.7 Import

Import
()

가

[5].

```
ObjectList import (  
    in string repository_id,  
    in Constraint criteria,  
    in Preference Pref,  
    in PolicyList Policies  
) raises (  
    IllegalPreference,  
    IllegalPolicyName,  
    IllegalRepID,  
    RepIDNotRegistered  
);
```

ID ,

ID ,

ID

4.2.1

4.2.2, 4.2.3

ID 가

IllegalPreference, *IllegalPolicyName*, *IllegalRepID* 가

ID 가

RepIDNotRegistered 가

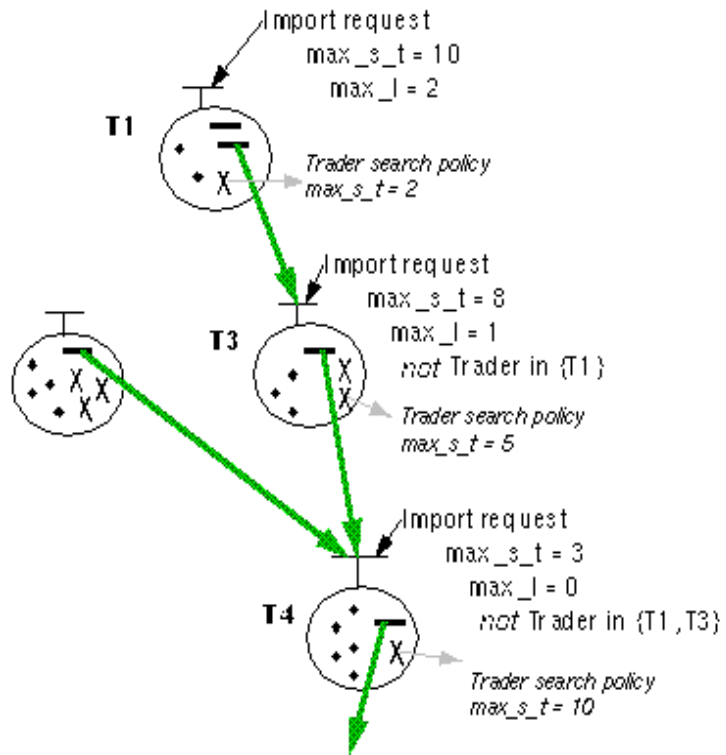
4.4 (Link Management)

Link, Modify Link, Describe Link, List Link . Add Link, Remove .

4.4.1 (Interworking Traders)

(heterogeneous) . (autonomous)
(link) . (associate)
(transparently)
가
(source) (target)
(query) 가
(edge) 가
가

[5].



7.

T1
 $\max_{s_t} () = 10, \max_l () = 2$. T1
 $\max_{s_t} = 2$. T1 2 가
 가 T1 가 . T1
 T3
 $\max_{s_t} = 8, \max_l = 1$ {T1} . T3
 $\max_{s_t} = 5$. 가 . T4

max_s_t = 3, max_l = 0 {T1, T3}
 T4 max_s_t = 10 . 3 가
 가 T3, T1 T1

4.4.2

(Exceptions)

```

exception DuplicatedObjectRef {
    Object reference;
};

```

가

가

```

exception IllegalObjectRef {
    Object reference;
};

```

. IOR

```

exception IllegalPropertyName {
    string name;
};

```

```

exception DuplicatedLinkName {

```

```

        string LinkName;
    };

    .

    exception LinkNameNotRegistered {
        string LinkName;
    };

```

4.4.3 Add Link

Export

Import

[5]. Add Link

```

void add_link (
    in string LinkName,
    in Object reference,
    in PropertyList list
) raises (
    DuplicatedLinkName,
    IllegalObjectRef,
    DuplicatedObjectRef,
    IllegalPropertyName
);

```

IOR

가

DuplicatedLinkName *DuplicatedObjectRef*

가

IllegalObjectRef

IllegalPropertyName

가

4.4.4 Remove Link

Remove Link

[5].

```
void remove_link (  
    in string LinkName  
) raises (  
    LinkNameNotRegistered  
);
```

LinkNameNotRegistered 가

4.4.5 Modify Link

Modify Link

[5].

```
void modify_link (  
    in string LinkName,  
    in Object reference,  
    in PropertyList list  
) raises (  
    LinkNameNotRegistered,  
    IllegalObjectRef,  
    IllegalPropertyName  
);
```

LinkNameNotRegistered 가

IllegalObjectRef *IllegalPropertyName* 가

4.4.6 Describe Link

Describe Link

[5].

```
void describe_link (  
    in string LinkName,  
    out Object reference,  
    out PropertyList list  
) raises (  
    LinkNameNotRegistered  
);
```

(

)

LinkNameNotRegistered 가 .

4.4.7 List Link

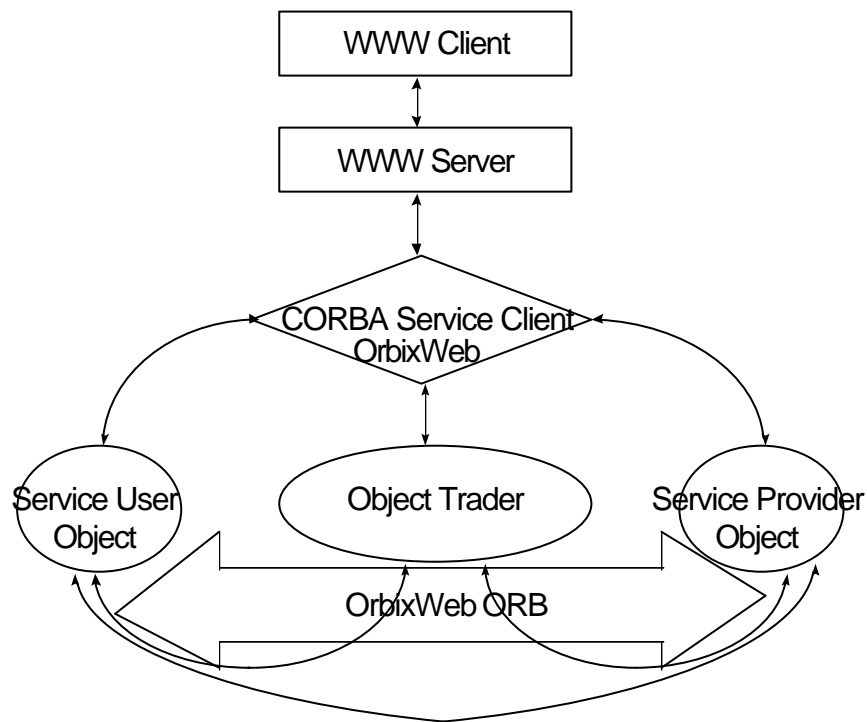
List Link

.

```
typedef sequence<string> LinkNameList;  
LinkNameList list_links ( );
```

5. WWW CORBA

WWW IONA
Technologies Orbix 2.0 [13] OrbixWeb 2.0 [14]



8. Object Trader Service in WWW using Orbix and OrbixWeb

5.1 OrbixWeb 2.0

WWW

CORBA
2.0 . Orbix 2.0 [13] OMG CORBA
CORBA 2.0 OMG IDL C++
C++ CORBA [24].
OrbixWeb 2.0 [14] IIOP Java ORB . OrbixWeb
Java 가 IIOP
Java CORBA . OrbixWeb
CORBA Java Orbix Java
CORBA 가
Orbix . Orbix
OrbixWeb IDL
Java 가 가
OrbixWeb 가
CORBA .
Orbix 2.0 OrbixWeb 2.0 WWW
8 . CORBA OrbixWeb 2.0
Java [15] WWW
CORBA CORBA
CORBA Orbix 2.0 C++
Solaris 2.5 Solaris 2.4 . WWW
3 4 .

5.2

5.2.1 SUO, SPO

(SUO, SPO)

CORBA IDL

4.3

```
struct Property {  
    string name;  
    any value;  
};
```

```
typedef sequence<Property> PropertyList;  
typedef sequence<string> PropertyNameList;  
typedef string Constraint;
```

```
struct Offer {  
    Object reference;  
    PropertyList properties;  
};
```

```
typedef sequence<Offer> OfferList;  
typedef sequence<Object> ObjectList;
```

```

typedef string Preference;
struct Policy {
    string name;
    any value;
};
typedef sequence<Policy> PolicyList;

```

```

interface Registry    Export, Withdraw, Modify, Describe, Browse, Import

```

```

interface Registry {

```

```

//                                Export

```

```

void export (
    in Object reference,
    in string repository_id,
    in PropertyList list
) raises (
    DuplicatedObjectRef,
    IllegalObjectRef,
    IllegalPropertyName,
    IllegalRepID
);

```

```

//                                Withdraw

```

```

void withdraw (
    in Object reference,
    in string repository_id
) raises (
    ObjectNotRegistered,
    IllegalObjectRef,
    IllegalRepID,
    RepIDNotRegistered
);

```

```

//                                     Modify                                     .

void modify (
    in Object reference,
    in string repository_id,
    in PropertyList list
) raises (
    IllegalObjectRef,
    IllegalPropertyName,
    ObjectNotRegistered,
    IllegalRepID,
    RepIDNotRegistered
);

//                                     Describe                                     .

Offer describe (
    in Object reference,
    in string repository_id
) raises (
    ObjectNotRegistered,
    IllegalObjectRef,
    IllegalRepID,
    RepIDNotRegistered
);

//
Browse                                     .

OfferList browse ();

//                                     .

ObjectList import (
    in string repository_id,
    in Constraint criteria,

```

```

        in Preference Pref,
        in PolicyList Policies
    ) raises (
        IllegalPreference,
        IllegalPolicyName,
        IllegalRepID,
        RepIDNotRegistered
    );
};

```

Property <name, value> export, withdraw, import, describe,
 browse Export, Withdraw, Import, Describe, Browse .

```

struct Record {
    string repository_id;
    OfferList objects;
};
typedef sequence<Record> Database;

```

Record
 Database .

5.2.2 CORBA

SUO

SUO

CORBA

SUO

SUO 가

SUO 가

SUO

CORBA

SUO

```

void import_request (
    in Constraint criteria,
    in Preference Pref,
    in PolicyList Policies,
    out string result
) raises (
    OperationFailed
);

```

```

import_request Criteria, Pref, Policies
SUO . SUO

```

가

Import

result

CORBA

CORBA

. Import

OperationFailed

가

5.2.3 CORBA

SPO

SPO

CORBA

(SPO)

```

Export, Withdraw, Modify
SPO

```

CORBA

SPO

CORBA

SPO


```

void export_request (
    in PropertyList list
) raises (
    OperationFailed
);

```

```

export_request
SPO          SPO          가      Export
              . Export          OperationFailed      가
.

```

```

void withdraw_request ( )
    raises (
        OperationFailed
    );

```

```

withdraw_request 가      SPO      Withdraw
                . Withdraw          OperationFailed      가
.

```

```

void modify_request (
    in PropertyList list
) raises (
    OperationFailed
);

```

```

modify_request
SPO          SPO          가      Modify
              . Modify          OperationFailed      가
.

```

5.3

WWW

, ,

가

가 가

가
가 .

가

가

가

9 .

User Interface

Java

CORBA

CORBA

CORBA

. CORBA

가 가 .

CORBA

SUO

CORBA

(SPO)

CORBA

(SPO)

가

Export, Modify,

Withdraw

SPO

CORBA

Export, Modify, Withdraw

)
 , A 가 ,
 , 1000 , A
 transport=taxi company=A dest=Kyungju dest=Pusan
 dest=Daegu fare=1000 , SPO
 . 가
 dest=Pusan && fare>800 && fare<1100
 , 가
 , A 가
 A

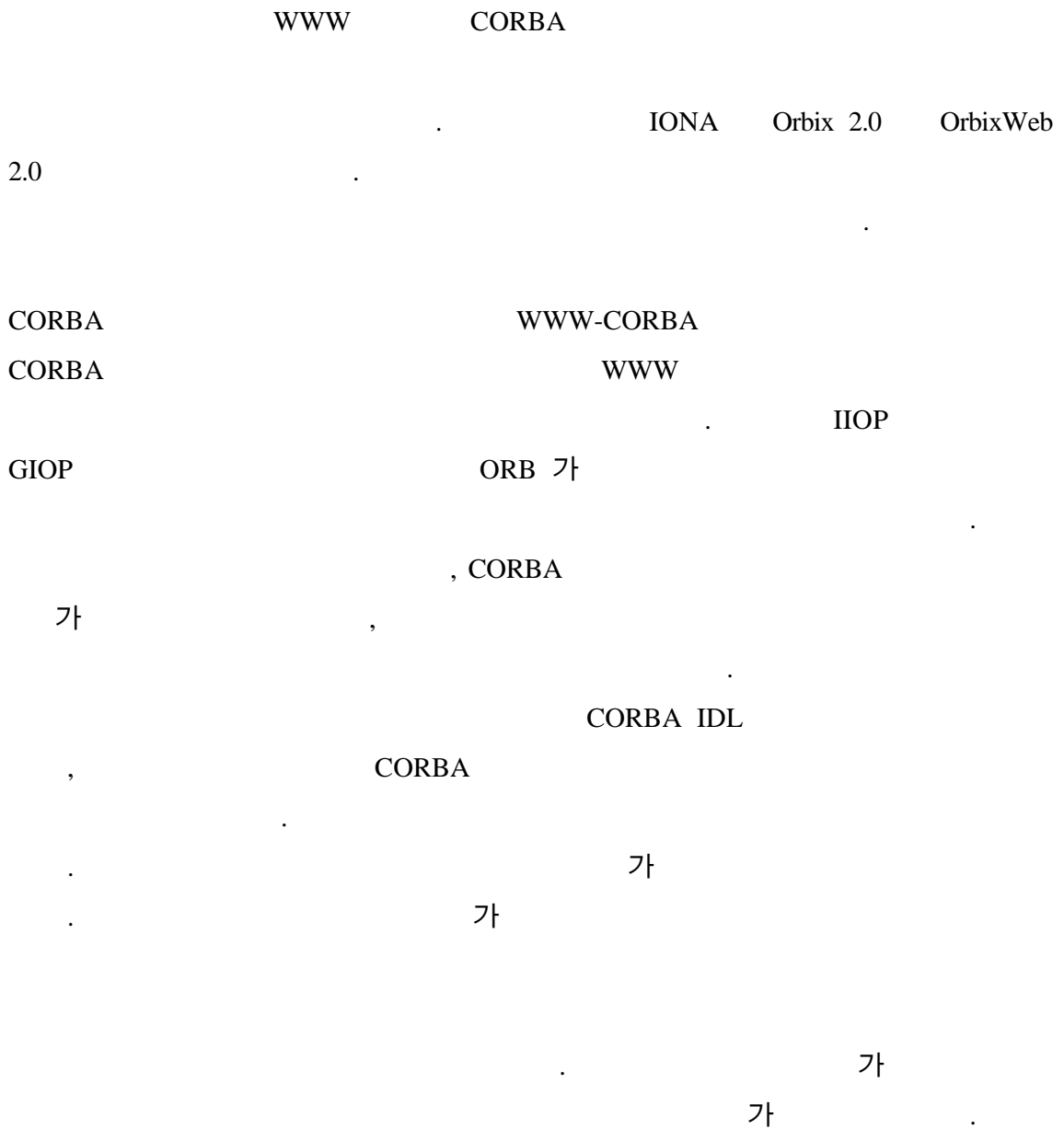
CORBA

가

가

가 가

6.



[2].

“Final Draft -ISO/IEC DIS 13235 - ODP Trading Function” [5]

[32]

가

CORBA

(matching algorithm)

가 CORBA

- [1] ISO/IEC JTC1/SC21/WG7, "Basic Reference Model of Open Distributed Processing", Parts 1-4, July 1993.
- [2] ISO/IEC 13235: 1994/Draft ODP Trading Function, "Annex A: Tutorial of the Trading Function", 1994.
- [3] ITU-T, Recommendation X.500, "The Directory - Overview of Concepts, Models and Services", 1993.
- [4] OMG, "The Common Object Request Broker: Architecture and Specification Revision 2.0", OMG TC Document, July 1995.
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:

CORBA IDL

```
//-----//
//  Object Trader Service CORBA IDL Specification  //
//                                     by Lee, Jae Seung //
//-----//

module ObjTrader {

    interface Registry;
    interface Link;

//    . <name, value> pair
    struct Property {
        string name;
        any value;
    };

    typedef sequence<Property> PropertyList;
    typedef sequence<string> PropertyNameList;

//    .
    typedef string Constraint;

//    .
    struct Offer {
        Object reference;
        PropertyList properties;
    };

    typedef sequence<Offer> OfferList;
}
```

```

typedef sequence<Object> ObjectList;

//

struct Record {
    string repository_id;
    OfferList objects;
};

typedef sequence<Record> Database;

//

typedef string Preference;

//

struct Policy {
    string name;
    any value;
};

typedef sequence<Policy> PolicyList;

typedef sequence<string> LinkNameList;

//

interface Registry {

    //

    //
    exception DuplicatedObjectRef {
        Object reference;
    };

    //

```

```

exception IllegalObjectRef {
    Object reference;
};

//          가
exception ObjectNotRegistered {
    Object reference;
};

//
exception IllegalPropertyName {
    string name;
};

//          ID.
exception IllegalRepID {
    string repository_id;
};

//          ID 가
exception RepIDNotRegistered {
    string repository_id;
};

//
exception IllegalPreference {
    Preference Pref;
};

//
exception IllegalPolicyName {
    string name;
};

//          Export
void export (
    in Object reference,

```



```

    ) raises (
        ObjectNotRegistered,
        IllegalObjectRef,
        IllegalRepID,
        RepIDNotRegistered
    );

    //
    //      Browse
OfferList browse ();

    //
ObjectList import (
    in string repository_id,
    in Constraint criteria,
    in Preference Pref,
    in PolicyList Policies
) raises (
    IllegalPreference,
    IllegalPolicyName,
    IllegalRepID,
    RepIDNotRegistered
);

};
// End of Interface Registry

//

interface Link {

    typedef sequence<string> LinkNameList;

    //

    //
exception DuplicatedObjectRef {

```

```

        Object reference;
    };

    //
    exception IllegalObjectRef {
        Object reference;
    };

    //
    exception IllegalPropertyName {
        string name;
    };

    //
    exception DuplicatedLinkName {
        string LinkName;
    };

    //
    exception LinkNameNotRegistered {
        string LinkName;
    };

    //      가      Add Link
    void add_link (
        in string LinkName,
        in Object reference,
        in PropertyList list
    ) raises (
        DuplicatedLinkName,
        IllegalObjectRef,
        DuplicatedObjectRef,
        IllegalPropertyName
    );

    //      Remove Link
    void remove_link (

```



```

        in string LinkName
    ) raises (
        LinkNameNotRegistered
    );

    // Describe Link
    void describe_link (
        in string LinkName,
        out Object reference,
        out PropertyList list
    ) raises (
        LinkNameNotRegistered
    );

    // List Link
    LinkNameList list_links ();

    // Modify Link
    void modify_link (
        in string LinkName,
        in Object reference,
        in PropertyList list
    ) raises (
        LinkNameNotRegistered,
        IllegalObjectRef,
        IllegalPropertyName
    );
};
// End of Interface Link
};
// End of module ObjTrader

```

