

# **A novel wide area O.D.S dependent replicas consistency scheme in transnational hierarchy topologies Enterprise organizations**

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*Abstract - The wide area data consistency become increasingly important in the GTEO as a result of using caching (Amiri,2003), middleware (Emmanuel,2004)(Jimenez,2003), edge server and database replication (Bettina,2000)(Decker,2003)(Zhang,2003) technologies. It is difficult for enterprise usage copies with local / remote ODS object partial dependency relationships to maintain their consistency. Today's data integration solution based on document and application centralize conceptual will take more effort in application system. In addition, more and more database middleware API can't truly reduce coding effort and maintenance costs. A novel application platform was proposed which consists of active, real time, automation, and global routing properties. The result can expand enterprise database system with ODS dependency replica correction maintenance abilities and provide adjustable update routing policies based on ODS dependency replicas usage mining results.*

**Keywords :** global transnational enterprise organizations (GTEO), original data source (ODS), data consistency, middleware

## **1.0 Introduction**

So far, many skills like database replication and middleware integration were addressed to reach replicas consistency with remote data source , but that can not ensure ODS objects dependency copies with global consistency (Adya,2002)(Susarla,2005)(Yu,2004) and global correctness in transnational enterprises organization. If replicas having partial dependency relationships with specific ODS object inside transnational enterprises organization can't maintain mutual consistency, the following problems will be happened. 1. The Bullwhip Effect will be occurred in e-business supply chain operation. 2. Replicas consuming application can't make sure the newest version of access copies and its owner. It will also make repetitive replicas updated operations and affect the replicas reuse freshly. 3. It is easy for global transnational enterprise organization to occur horizontal information that lacks harmony. 4. The dependent replicas usage mining results can't be sent to ODS to make adaptive dependency replicas updating route policies and value added updating services.

A novel application platform was proposed which consists of active, real time, automation, and global routing technologies. When original data source object was triggered by update event, all replicas with the specific

ODS dependent relationship could be automatically and real time updated. The ODS dependency replicas usage mining rate is a function of dependency replica operation response time and turnaround time. The updating route policy scheduling rate is a function of usage mining and reservation priority. The production rate of activity represented as a time variable. The result can expand wide area enterprise database replicas contained ODS dependency relationships with real time correctness maintenance abilities.

This paper is organized as follows. In Section II, we describe framework concept models. In Section III, we illustrate system architecture and primary updating copy routing algorithms in hierarchical topology Enterprises. Finally, discussion and conclusion are given in Section IV .

## 2.0 Framework Concept Model Description

### 2.1 Infrastructure Concept Model

In figure 1, a novel global dependent replica automatic updating concept model was proposed.

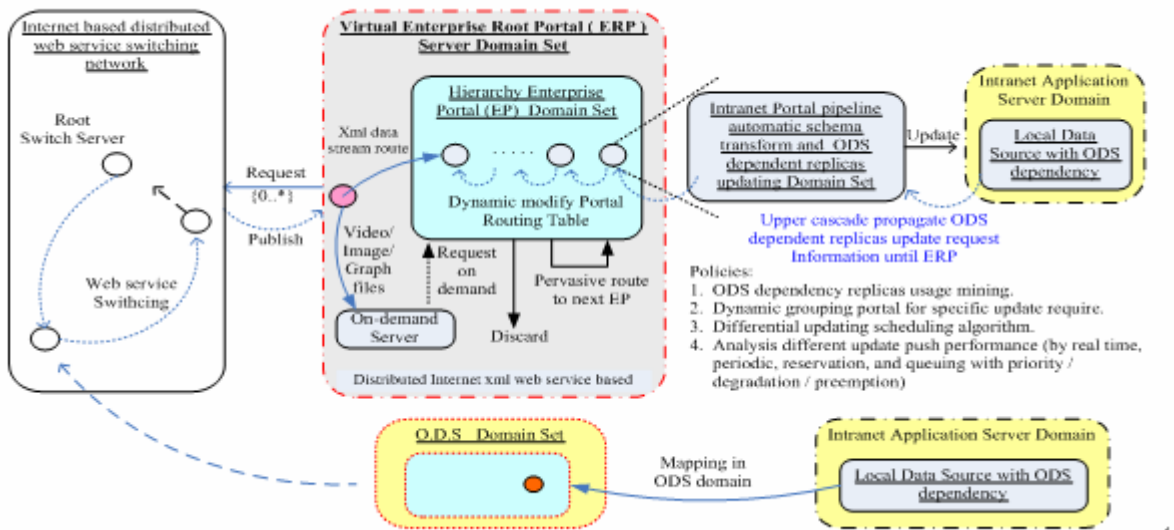


Figure1. Infrastructure Concept Model

### 2.2 Dependency replicas operation model in Enterprise

Intranet replicas operation model have three kinds of application. In figure2, replicas with partial specific remote ODS dependency relationships was denoted by (a). Replicas with ODS role in extranet enterprise supply chain was denoted by (b). Replicas with partial dependency with a specific self-enterprise intranet ODS was denoted by (c).

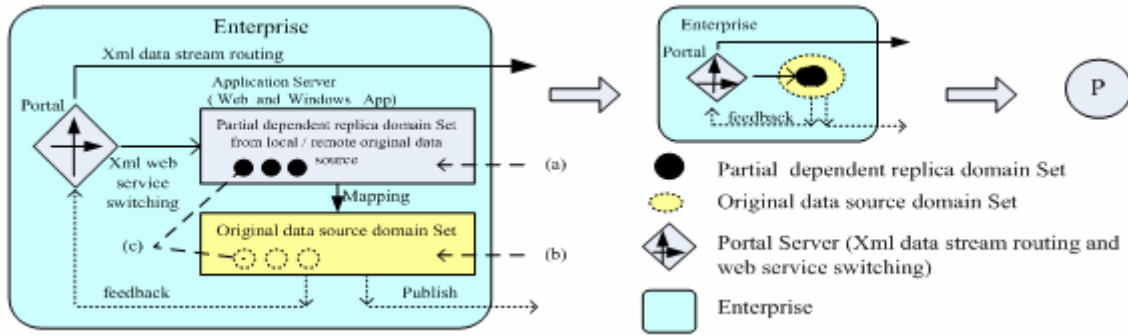


Figure2. dependency replicas operation model in Enterprise

### 2.3 Propagation of ODS updating replicas

The active ODS dependent replica updating framework allow automatic and global routing to 4 kinds of enterprise structure. 1. single enterprise. 2. enterprise with hierarchy relationship. 3. routing between two extranet hierarchy relationship enterprises. 4. route and trigger another ODS between extranet global transnational enterprise organizations.

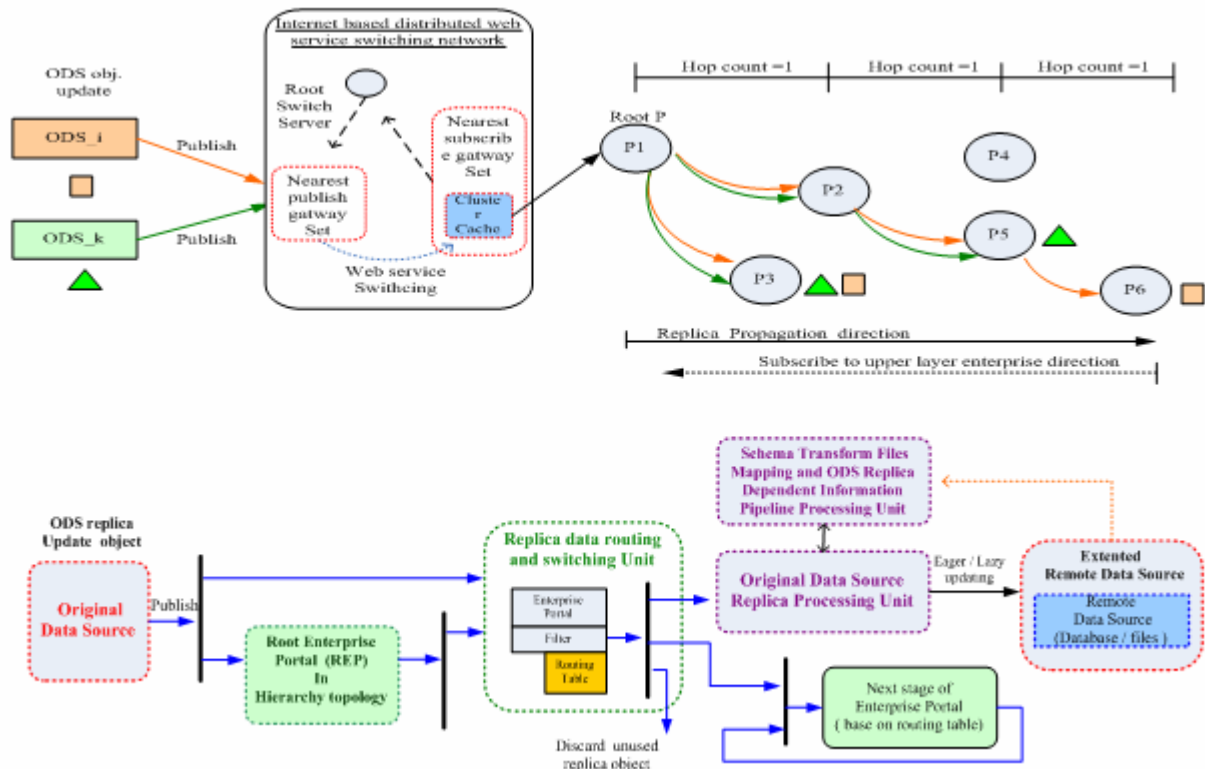


Figure 3. The propagation of ODS updating replica in hierarchy topology Enterprises

### 2.4 Upper propagation ODS dependent replicas updating request message

The Enterprise Portal (EP) must collect the ODS dependent replicas updating information, and modify the local routing table contents. The information will cascade propagation to upper EP. All updating routing contents procedure will not stop until propagation to Root EP. Show in figure 4.

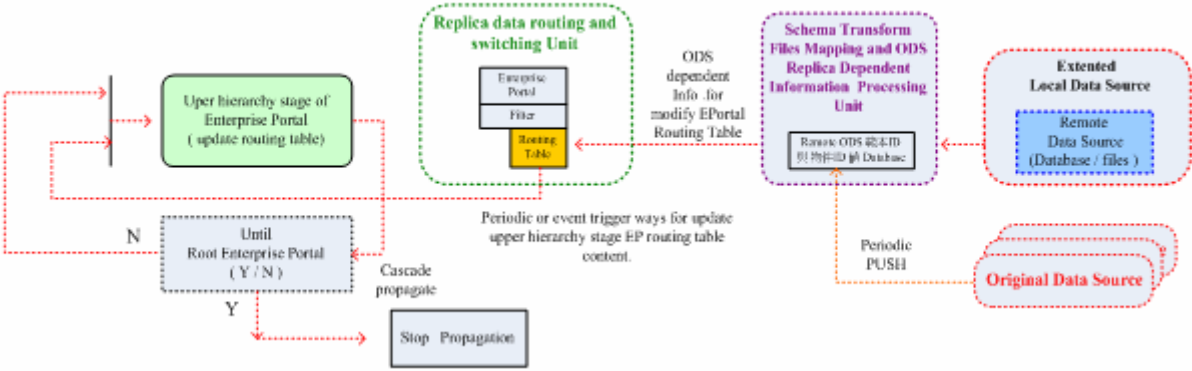


Figure4. Cascade upper propagation ODS dependent replicas updating request Information

### 3.0 System architecture

#### 3.1 Infrastructure Model

On the basis of the ubiquitous active real time updating process framework, several models are built. The 「 replica recursive routing model 」 are built within a multistage and hierarchical global transnational enterprise portal. The 「 primary copy routing policy and scheduling model 」 are built within an original data source stage enterprise portal. The 「 pipeline schema transformation model 」 and 「 ODS object dependency replica usage mining model 」 are built within each application server of transnational enterprise. In this paper, a novel framework was proposed which consists of active, real time, automation, and global routing updating replica from ODS domain set.

When ODS object occurred add/insert events, according to subscribe lists, new copies will push to all global enterprise portal which contained dependency replicas. The enterprise portal server then make one of the choice about discard/ rerouting to lower hierarchy portal/automatic pipeline processing and schema transformation. All wide area O.D.S dependent replicas consistency and correctness can be automatic maintenance. Enterprise Intranet application system need not change any source code.

#### 3.2 Portal server xml data stream routing algorithm

Routing algorithm was built into each enterprise portal for assisting the xml data stream route path choosing.

Table 1. Routing table fields define

Routing Table (RT) fields	description
action state flag (ASF)	denote when add/delete ODS dependent replicas in

	enterprise LDS
ODS template ID (UUID)	ODS template identify defined by ODS site
ODS replica Primary key value(PK)	Instance of specific ODS template
local connect / remote connect (LC / RC)	Dependency replica update request issued by local enterprise or lower level enterprise portal
Destination Portal ID (DPID)	Original enterprise Identify that issues the update request
Hop Count value (HC)	The distance between the enterprise contained the newest routing information and request enterprise
WSC_port	Call next stop portal web service

A. *Basic principle:*

- ODS dependency replica update request information always maintained by enterprise portal
- Information Included UUID value, PK value , Hop count, web service client etc. need to log in portal routing table from lower hierarchy enterprise request issues.
- Portal's replica update routing information can come from intranet and extranet enterprise.
- when a ODS update replica publish to Portal ,it will discard, send to processing unit, or reroute to lower portal depend on routing table check results.
- for each route request from lower hierarchy portal will add a HC value to routing table's Hop Count value field.

B. *Routing algorithms :*

Show in Figure 5. Apply the rules to each route request.

```

If (ASF==add) {
  // ie: rule.2-1 : ASF == add
  If (route request info.(UUID · PK · DPTD) sent from lower portal does not exist){
    //(rule.2-1-1)
    add this information into RT and upper cascade propagate this add event registry}
  Else If (route request info (WSC_port) identical){
    //(rule. 2-1-2-a)
    replace with the new route request info. and cascade propagate to upper portal when TTL trigger.}
  Else If (route request info (WSC_port) not identical){
    //(rule. 2-1-2-b)
    If (new HC value < RT's HC){
      //(rule. 2-1-2-b-1)
      replace with the new route request info. and cascade call back to lower hierarchy portal to disable the route with the same DPID when its WSC_port <> null }
    Else {
      //(rule. 2-1-2-b-II)
      Local portal do nothing then cascade call back to lower hierarchy portal to disable the route with the same DPID when its WSC_port <> null }
    }
  }
}
Else {
  // ie: rule.2-2 : ASF == delete
  If (route request info does not exist in RT){
    //(rule. 2-2-1)
    Local portal do nothing }
  Else {
    //(rule. 2-2-2)
    Find and delete the record in RT, and upper cascade propagate delete event registry }
}

```

Figure5. Routing algorithms built in each Enterprise Portal

## 4.0 Discussion and Conclusion

It's mainly contribution as follows. 1. The ODS dependency replicas usage mining rate is a function of dependency replica operation response time and turnaround time. 2. The updating route policy is a function of usage mining and reservation priority. 3. Different value added update service scheme was also analyzed. For example, active updating pushed by real time, periodic, reservation, and queuing with priority / degradation / preemption etc. The result can expand wide area enterprise database replicas contained ODS dependency relationships with real time wide area consistency maintenance abilities.

## 5.0 References

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