

Changes in Harvest 1.9

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After presenting long term goals of Harvest development in the last SINN 02 conference, this article describes recent progresses already achieved. This includes the description of changes in the gatherer where the embedded database was replaced by a more advanced embedded database and changes in the broker for the transition from current SOIF to XML. It also gives an overview of short term goals in Harvest development.

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Chapter 1

Gatherer

1.1 Switched from GDBM to QDBM

The most visible change is the switch of the embedded database from GDBM to *QDBM*.

QDBM's advantages are:

- Improved performance
- Support for databases larger than 2GB on 32BIT systems
- Large object support

The gatherer is much faster now on systems which gather over fast links like local network. In this scenario, the bottleneck still seems to be the database access, especially when gathering large amount (some GBs) of data on current hardware (ix86, 650MHz, IDE harddisks).

While QDBM increased the gathering speed quite a lot in this scenario, the gatherer still suffers from the phenomenon of wild harddisk activity without actually doing any collection. Even though it happens much later than with GDBM, this still needs some investigation. It seems to be a filesystem buffer issue of the underlying OS, so perhaps this is the reason why there are/were some databases making raw access to the disk bypassing the filesystem layer of the OS.

The improved speed won't be noticeable in situations where the bandwidth is the main limiting factor, of course and there is still some work to be done.

In an additional attempt to speed up the gathering, the default configuration was changed to not to sort keywords, which saves two forks (sort and uniq) for each document. This will make summaries larger but I have to check if I can get rid of the "keywords" attribute altogether or have to write a function to create word list. However, this will depends on how we will map SOIF to XML.

I will also get rid of URI attribute from summaries, which was just introduced to improve the search results when using Glimpse.

Current integration QDBM to Harvest is ugly but makes it easy to tweak the parameters. This will be cleaned up after fine tuning of QDBM parameters.

Chapter 2

Broker

2.1 Localized User Interface

Thanks to many individuals on the net as well as some colleagues, we have a large number of localized user interface. The current list includes English, French, German, Italian, Russian, Spanish and Swedish and people continue to donate localized user interface.

2.2 Bibliometric Ranking Prototype

A bibliometric ranking prototype is available at <http://harvest.sourceforge.net/wip/rank-20021230.tar.gz>.

It creates a database which stores the URL and number of URLs with a link pointing to it as tuples in a database. This could be used to evaluate the importance and relevance of a specific URL.

After some testing there were following issues that need to be addressed:

- There must be a rather complete pool of linked documents. If the pool is too small or incomplete, the number of links pointing to a document would usually be one, which isn't very helpful to evaluate its importance.
- Some documents like the footnotes pages in latex2html generated html documents have large number of pages pointing to them. This leads to bogus ranking results.

2.3 Support for Zebra as Fulltext Indexer

Zebra was merged into Harvest source tree. The usual steps to build, install and configure Harvest will result in a usable *Zebra* based search system along with the old *Glimpse* based search system. For users, this should make it easy to migrate to *Zebra*. For developers, it is easy to compare the results between *Glimpse* and *Zebra*.

2.4 Data Modelling based on GILS based on Work of Peter Valkenburg / TERENA

The current data model used in Harvest is based on Peter Valkenburg's work done for the TERENA project and is based on SOIF to GILS mapping from the Nordic Web Index (NWI).

2.5 Switch from SOIF to XML

After some testing, I found flaws in the regular expression based SOIF input filter of Zebra. I decided to switch to switch to XML which is supported by Zebra, rather than trying to work around this problem. Since the data modeling isn't finished yet, I wrote a Perl script `soif2gils.pl` to convert SOIF to XML, because it is much faster to test some different mappings than doing the mapping in C.

`soif2gils.pl` converts SOIF files located in *object* directory into GILS files into *objects-xml* directory. It is intended to be used for testing how to map SOIF to XML and will become obsolete once the broker can handle XML objects.

Chapter 3

ToDo

3.1 Finalize Data Modelling

The modeling of data isn't finished, but it seems that GILS offers a complete framework to hold the summarized objects. I don't see any reason to create a new framework, but I appreciate your wishes or suggestions because in this development stage, it would be easy to make changes in data model.

3.2 Switch from SOIF to XML in Broker

The transition of the broker's data format from SOIF to XML will be done in single steps, so any existing components which uses SOIF will remain usable until the transition of all components are finished. To do this, following steps are necessary:

- Import XML from other Brokers/Gatherers
- Import SOIF and transform to XML
- Store XML objects als large objects in QDBM

3.3 Switch from SOIF to XML in Gatherer

Keeping backward compatibility for the gatherer during transition is also necessary and will require following steps:

- Transform SOIF summaries from summarizers to XML
- Modify summarizers to produce summaries in XML
- Modify gatherer to export XML
- Store XML objects als large objects in QDBM

I plan to experiment with large objects of QDBM, which seems to be very promising, especially for the broker. It will make bookkeeping of the objects easier and reduce the memory requirement, because the broker doesn't have to use a registry which is kept in memory.

When having the objects as large objects in the gatherer, it would also be possible to share the objects between gatherer and broker, when both are running on same machine.

3.4 Maintenance Releases of stable Version

Bugfixes introduced in the development tree will be ported to the stable version of Harvest. It will also feature a Russian translation of Harvest User's Manual when Andrej finishes the translation.

Chapter 4

Sample Files

4.1 SOIF

This is a sample SOIF file:

```
@FILE { http://harvest.sourceforge.net/  
update-time{10}:      1065602907  
full-text{718}: Harvest: A Distributed Search System  
Harvest: A Distributed Search System  
Home  
Sites using Harvest  
Download  
Contributed Code  
Todo List  
Links  
Contributors  
User's Manual  
FAQ  
Installation  
ChangeLog  
NEWS  
Harvest  
Harvest Homepage  
Miscellaneous Documents and Presentations  
Directory Index of Work in Progress Version of Harvest  
SourceForge: Project Info - Harvest  
Stable Version of Harvest  
Homepage of stable Version  
Historic Versions of Harvest  
Harvest User's Manual 1.4.pl2 (January 31, 1996)  
Harvest User's Manual 1.4.pl2 as PostScript  
Developers  
Kang-Jin Lee  
Javier Masa Marin  
Harald Weinreich  
Home
```

Sites using Harvest

Download

Contributed Code

Todo List

Links

Contributors

User's Manual

FAQ

Installation

ChangeLog

NEWS

headings{111}: Harvest: A Distributed Search System

Harvest

Stable Version of Harvest

Historic Versions of Harvest

Developers

title{37}: Harvest: A Distributed Search System

url-references{836}: harvest/doc/index.html

harvest/doc/sites.html

harvest/doc/download.html

harvest/contrib/index.html

harvest/doc/todo.html

harvest/doc/links.html

harvest/doc/CONTRIBUTORS

harvest/doc/html/manual.html

harvest/doc/html/FAQ.html

harvest/INSTALL.harvest

harvest/ChangeLog

harvest/NEWS

harvest/doc/index.html

misc/

wip/

<http://sourceforge.net/projects/harvest/>

harvest-1.8/doc/index.html

harvest-1.4.pl2-docs/

harvest-1.4.pl2-docs/user-manual.ps.gz

developers/lee/

developers/masa/

<http://www.weinreichs.de/>

harvest/doc/index.html

harvest/doc/sites.html

harvest/doc/download.html

harvest/contrib/index.html

harvest/doc/todo.html

harvest/doc/links.html

harvest/doc/CONTRIBUTORS

harvest/doc/html/manual.html

```
harvest/doc/html/FAQ.html
harvest/INSTALL.harvest
harvest/ChangeLog
harvest/NEWS
http://harvest.sourceforge.net/
http://sourceforge.net/

keywords{595}: Home
Sites using Harvest
Download
Contributed Code
Todo List
Links
Contributors
User's Manual
FAQ
Installation
ChangeLog
NEWS
Harvest Homepage
Miscellaneous Documents and Presentations
Directory Index of Work in Progress Version
  of Harvest
SourceForge:
  Project Info - Harvest
Homepage of stable
  Version
Harvest User's Manual 1.4.pl2
  (January 31, 1996)
Harvest User's
  Manual 1.4.pl2 as PostScript
Kang-Jin Lee
Javier Masa Marin
Harald Weinreich
Home
Sites using Harvest
Download
Contributed Code
Todo List
Links
Contributors
User's Manual
FAQ
Installation
ChangeLog
NEWS

md5{32}:          2ba0877c91bbc00e6db037d5604ea860
uri{31}:          http://harvest.sourceforge.net/
file-size{4}:    3142
```

```
type{4}:          HTML
gatherer-version{6}:  1.9.10
gatherer-host{10}:   dyn214.tab
gatherer-name{37}:   Contents of the dyn214.tab WWW server
refresh-rate{6}:     604800
time-to-live{7}:     2419200
last-modification-time{10}:  1039163872
description{37}:     Harvest: A Distributed Search System

}
```

4.2 XML

This is the XML file converted from the sample SOIF file by soif2gils.pl.

```
<gils>

<availability>
  <linkage>
    http://harvest.sourceforge.net/
  </linkage>
</availability>

<dateOfLastModification>
  1039163872
</dateOfLastModification>

<abstract>
  Harvest: A Distributed Search System
</abstract>

<author>

</author>

<localSubjectIndex>
  <localSubjectTerm>
    Home
    Sites using Harvest
    Download
    Contributed Code
    Todo List
    Links
    Contributors
    User's Manual
    FAQ
    Installation
    ChangeLog
    NEWS
```

Harvest Homepage
Miscellaneous Documents and Presentations
Directory Index of Work in Progress Version
of Harvest
SourceForge:
 Project Info - Harvest
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 Version
Harvest User's Manual 1.4.pl2
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Harald Weinreich
Home
Sites using Harvest
Download
Contributed Code
Todo List
Links
Contributors
User's Manual
FAQ
Installation
ChangeLog
NEWS
 </localSubjectTerm>
</localSubjectIndex>

<supplementalInformation>
 <bytes>
 3142
 </bytes>
</supplementalInformation>

<crossReference>
 <linkage>
 harvest/doc/index.html
harvest/doc/sites.html
harvest/doc/download.html
harvest/contrib/index.html
harvest/doc/todo.html
harvest/doc/links.html
harvest/doc/CONTRIBUTORS
harvest/doc/html/manual.html
harvest/doc/html/FAQ.html
harvest/INSTALL.harvest
harvest/ChangeLog
harvest/NEWS

```
harvest/doc/index.html
misc/
wip/
http://sourceforge.net/projects/harvest/
harvest-1.8/doc/index.html
harvest-1.4.pl2-docs/
harvest-1.4.pl2-docs/user-manual.ps.gz
developers/lee/
developers/masa/
http://www.weinreichs.de/
harvest/doc/index.html
harvest/doc/sites.html
harvest/doc/download.html
harvest/contrib/index.html
harvest/doc/todo.html
harvest/doc/links.html
harvest/doc/CONTRIBUTORS
harvest/doc/html/manual.html
harvest/doc/html/FAQ.html
harvest/INSTALL.harvest
harvest/ChangeLog
harvest/NEWS
http://harvest.sourceforge.net/
http://sourceforge.net/
  </linkage>
</crossReference>

<title>
  Harvest: A Distributed Search System
</title>

<Body-of-text>
Harvest: A Distributed Search System
Harvest: A Distributed Search System
Home
Sites using Harvest
Download
Contributed Code
Todo List
Links
Contributors
User's Manual
FAQ
Installation
ChangeLog
NEWS
Harvest
Harvest Homepage
Miscellaneous Documents and Presentations
Directory Index of Work in Progress Version of Harvest
```

SourceForge: Project Info - Harvest
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 Homepage of stable Version
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 Developers
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 Harald Weinreich
 Home
 Sites using Harvest
 Download
 Contributed Code
 Todo List
 Links
 Contributors
 User's Manual
 FAQ
 Installation
 ChangeLog
 NEWS
 </Body-of-text>

 </gils>

4.3 Zebra Input Filter used to parse SOIF

This is the *soif.ftt* from Zebra. This is unusable, but shows the mapping from SOIF to GILS.

```

# Crude input-filter for SOIF records -- one record per file.
# Author: Peter Valkenburg / TERENA (valkenburg@terena.nl)
# Version 0.2 (09/09/1998).
# This sort of follows the Nordic Web Index convention of GILS attribute use.
# Modified by Kang-Jin Lee (lee@arco.de)
# 07/10/1999

# We'll use GILS structured records.
BEGIN                                { begin record gils }

# URL will be GILS' availability/linkage
/^@[A-Za-z](-|[.A-Za-z_])* { / BODY /$ / {
                                begin element availability
                                data -element linkage $1
                                end element
                                }

# Type will be GILS' availability/linkageType
/^[tT]type{[0-9]+}:\t/ BODY /$ / {

```

```

        begin element availability
        data -element linkageType $1
        end element
    }

# Last modification time will be Bib-1 Use Attribute 1012
/^[lL]ast-[mM]odification-[tT]ime{[0-9]+}:\t/ BODY /$/ {
    data -element dateOfLastModification $1
}

# The MD5 checksum is used as a unique identifier under Bib-1 Use Attribute 1007
/^[mM][dD]5{[0-9]+}:\t/ BODY /$/ { data -element controlIdentifier $1 }

# Description will be Bib-1 Use Attribute 62
/^[dD]escription{[0-9]+}:\t/ BODY /^(([-|. _A-Za-z0-9])+{[0-9]+}:\t.*|)}$/ {
    data -element abstract $1
    unread 2
}

# Author will be Bib-1 Use Attribute 1003 (if gils.abs maps originator to it!!)
/^[aA]uthor{[0-9]+}:\t/ BODY /^(([-|. _A-Za-z0-9])+{[0-9]+}:\t.*|)}$/ {
    data -element author $1
    unread 2
}

# Keywords will be GILS' localSubjectIndex/localSubjectTerm
/^[kK]eywords{[0-9]+}:\t/ BODY /^(([-|. _A-Za-z0-9])+{[0-9]+}:\t.*|)}$/ {
    begin element localSubjectIndex
    data -element localSubjectTerm $1
    unread 2
    end element
}

# File-size will be GILS' supplementalInformation/bytes
/^[fF]ile-[sS]ize{[0-9]+}:\t/ BODY /$/ {
    begin element supplementalInformation
    data -element bytes $1
    unread 2
    end element
}

# Update-Time will be GILS' supplementalInformation/lastChecked
/^[uU]pdate-[tT]ime{[0-9]+}:\t/ BODY /$/ {
    begin element supplementalInformation
    data -element lastChecked $1
    unread 2
    end element
}

# url-references will be GILS' crossReference/linkage

```

```

/^[uU]rl-[rR]eferences{[0-9]+}:\t/ BODY /^(([-|[_A-Za-z0-9])+{[0-9]+}:\t.*|})$/ {
    begin element crossReference
    data -element linkage $1
    unread 2
    end element
}

# Title will be Bib-1 Use Attribute 4
/^[tT]itle{[0-9]+}:\t/ BODY /^(([-|[_A-Za-z0-9])+{[0-9]+}:\t.*|})$/ {
    data -element Title $1
    unread 2
}

# Body and Partial-Text will be Bib-1 Use Attribute 1010
# Is Body really commonly used in S0IF? Anyway, Full-Text is used by Harvest.
#[bB]ody{[0-9]+}:\t/ BODY /^(([-|[_A-Za-z0-9])+{[0-9]+}:\t.*|})$/ {
#    data -element sampleText $1
#    unread 2
#}

/[fF]ull-[tT]ext{[0-9]+}:\t/ BODY /^(([-|[_A-Za-z0-9])+{[0-9]+}:\t.*|})$/ {
    data -element sampleText $1
    unread 2
}

/[pP]artial-[tT]ext{[0-9]+}:\t/ BODY /^(([-|[_A-Za-z0-9])+{[0-9]+}:\t.*|})$/ {
    data -element sampleText $1
    unread 2
}

/^(([-|[_a-zA-Z0-9])+{[0-9]+}:\t/ BODY /^(([-|[_A-Za-z0-9])+{[0-9]+}:\t.*|})$/ {
    unread 2
}

END { end record }

```

4.4 BIB-1 Attribute Set

This is BIB-1 attribute set. It is a subset of GILS.

```

# $Id: bib1.att,v 1.1 2002/10/22 12:51:09 adam Exp $
# Bib-1 Attribute Set
name bib1
reference Bib-1

att 1          Personal-name
att 2          Corporate-name
att 3          Conference-name
att 4          Title
att 5          Title-series
att 6          Title-uniform
att 7          ISBN

```

att 8	ISSN
att 9	LC-card-number
att 10	BNB-card-number
att 11	BGF-number
att 12	Local-number
att 13	Dewey-classification
att 14	UDC-classification
att 15	Bliss-classification
att 16	LC-call-number
att 17	NLM-call-number
att 18	NAL-call-number
att 19	MOS-call-number
att 20	Local-classification
att 21	Subject-heading
att 22	Subject-Rameau
att 23	BDI-index-subject
att 24	INSPEC-subject
att 25	MESH-subject
att 26	PA-subject
att 27	LC-subject-heading
att 28	RVM-subject-heading
att 29	Local-subject-index
att 30	Date
att 31	Date-of-publication
att 32	Date-of-acquisition
att 33	Title-key
att 34	Title-collective
att 35	Title-parallel
att 36	Title-cover
att 37	Title-added-title-page
att 38	Title-caption
att 39	Title-running
att 40	Title-spine
att 41	Title-other-variant
att 42	Title-former
att 43	Title-abbreviated
att 44	Title-expanded
att 45	Subject-precis
att 46	Subject-rswk
att 47	Subject-subdivision
att 48	Number-natl-biblio
att 49	Number-legal-deposit
att 50	Number-govt-pub
att 51	Number-music-publisher
att 52	Number-db
att 53	Number-local-call
att 54	Code-language
att 55	Code-geographic
att 56	Code-institution
att 57	Name-and-title

att 58	Name-geographic	
att 59	Place-publication	
att 60	CODEN	
att 61	Microform-generation	
att 62	Abstract	
att 63	Note	
att 1000	Author-title	
att 1001	Record-type	
att 1002	Name	
att 1003	Author	
att 1004	Author-name-personal	
att 1005	Author-name-corporate	
att 1006	Author-name-conference	
att 1007	Identifier-standard	
att 1008	Subject-LC-childrens	
att 1009	Subject-name-personal	
att 1010	Body-of-text	
att 1011	Date/time-added-to-db	
att 1012	Date/time-last-modified	
att 1013	Authority/format-id	
att 1014	Concept-text	
att 1015	Concept-reference	
att 1016	Any	1016,4,1005,62
att 1017	Server-choice	
att 1018	Publisher	
att 1019	Record-source	
att 1020	Editor	
att 1021	Bib-level	
att 1022	Geographic-class	
att 1023	Indexed-by	
att 1024	Map-scale	
att 1025	Music-key	
att 1026	Related-periodical	
att 1027	Report-number	
att 1028	Stock-number	
att 1030	Thematic-number	
att 1031	Material-type	
att 1032	Doc-id	
att 1033	Host-item	
att 1034	Content-type	
att 1035	Anywhere	
att 1036	Author-Title-Subject	

4.5 GILS Attribute Set

This is the GILS attribute set, which will be used in Harvest to store the summarized objects.

```
# $Id: gils.att,v 1.1 2002/10/22 12:51:09 adam Exp $
name gils
```

```
reference GILS-attset
include bib1.att
```

```
att 2000      Distributor
att 2001      Distributor-Name
att 2002      Index-Terms                # Subject-Terms-Contr.
att 2003      Purpose
att 2004      General-Access-Constraints
att 2005      Use-Constraints
att 2006      Distributor-Organization
att 2007      Distributor-Street-Address
att 2008      Distributor-City
att 2009      Distributor-State-or-Province
att 2010      Distributor-Zip-or-Postal-Code
att 2011      Distributor-Country
att 2012      Distributor-Network-Address
att 2013      Distributor-Hours-of-Service
att 2014      Distributor-Telephone
att 2015      Distributor-Fax
att 2016      Resource-Description
att 2017      Order-Information
att 2018      Technical-Prerequisites
att 2019      Available-Time-Structured
att 2020      Available-Time-Textual
att 2021      Linkage
att 2022      Linkage-Type
att 2023      Contact-Name
att 2024      Contact-Organization
att 2025      Contact-Street-Address
att 2026      Contact-City
att 2027      Contact-State-or-Province
att 2028      Contact-Zip-or-Postal-Code
att 2029      Contact-Country
att 2030      Contact-Network-Address
att 2031      Contact-Hours-of-Service
att 2032      Contact-Telephone
att 2033      Contact-Fax
att 2034      Agency-Program
att 2035      Sources-of-Data
att 2036      Subject-Thesaurus
att 2037      Methodology
att 2038      West-Bounding-Coordinate
att 2039      East-Bounding-Coordinate
att 2040      North-Bounding-Coordinate
att 2041      South-Bounding-Coordinate
att 2042      Place-Keyword
att 2043      Place-Keyword-Thesaurus
att 2044      Time-Period-Structured
att 2045      Time-Period-Textual
att 2046      Cross-Reference-Title
```

att 2047	Cross-Reference-Linkage
att 2049	Original-Control-Identifier
att 2050	Supplemental-Information
att 2051	Record-Review-Date
att 2052	Originator-Dissemination-Control
att 2053	Security-Classification-Control
att 2054	Cost
att 2055	Cost-Information
att 2056	Schedule-Number
att 2057	Controlled-Subject-Index
att 2058	Uncontrolled-Term
att 2059	Spatial-Domain
att 2060	Bounding-Coordinates
att 2061	Place
att 2062	Time-Period
att 2063	Availability
att 2064	Order-Process
att 2065	Available-Time-Period
att 2066	Access-Constraints
att 2067	Point-of-Contact
att 2068	Cross-Reference
att 2069	Available-Linkage
att 2070	Cross-Reference-Relationship
att 2071	Language-of-Record
att 2072	Beginning-Date
att 2073	Ending-Date
att 2074	Controlled-Term

4.6 GILS File

This is a sample GILS file from Zebra.

<gils>

<Title>

UTAH EARTHQUAKE EPICENTERS

<Acronym>

UCCSEIS

</Acronym>

</Title>

<Originator>

UTAH GEOLOGICAL AND MINERAL SURVEY

</Originator>

<Local-Subject-Index>

APPALACHIAN VALLEY; EARTHQUAKE; EPICENTER; SEISMOLOGY; UTAH

</Local-Subject-Index>

<Abstract>

Five files of epicenter data arranged by date comprise this data set. These files are searchable by magnitude and longitude/latitude. Hardcopy of listing and plot of requested area available. Epicenter location and date, magnitude, and focal depth available.

<Format>

DIGITAL DATA SETS

</Format>

<Data-Category>

TERRESTRIAL

</Data-Category>

<Comments>

Data are supplied by the University of Utah Seismograph Station. The Utah Geological and Mineral Survey (UGMS) is merely a clearinghouse of the data.

</Comments>

</Abstract>

<Spatial-Domain>

<Geographic-Coverage>

US STATE

</Geographic-Coverage>

<Coverage-Description>

UTAH

</Coverage-Description>

<Bounding-Coordinates>

<West-Bounding-Coordinate>

-114

</West-Bounding-Coordinate>

<East-Bounding-Coordinate>

-109

</East-Bounding-Coordinate>

<North-Bounding-Coordinate>

42

</North-Bounding-Coordinate>

<South-Bounding-Coordinate>

37

</South-Bounding-Coordinate>

</Bounding-Coordinates>

</Spatial-Domain>

<Time-Period>


```
<Time-Period-Textual>
-PRESENT
</Time-Period-Textual>
</Time-Period>

<Availability>

<Distributor>

<Organization>
UTAH GEOLOGICAL AND MINERAL SURVEY
</Organization>

<Street-Address>
606 BLACK HAWK WAY
</Street-Address>

<City>
SALT LAKE CITY
</City>

<State>
UT
</State>

<Zip-Code>
84108
</Zip-Code>

<Country>
USA
</Country>

<Telephone>
(801) 581-6831
</Telephone>
</Distributor>

<Resource-Description>
UTAH EARTHQUAKE EPICENTERS
</Resource-Description>

<Technical-Prerequisites>

<Data-Set-Type>
AUTOMATED
</Data-Set-Type>

<Access-Method>
BATCH
```

```
</Access-Method>

<Number-of-Records>
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