LDAP crawlers use cases, dangers and how to cope with them

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Agenda

- What can Crawlers do?
- Proposal for crawler policy definition
- Crawler detection mechanisms that could be implemented in the server
What is an LDAP crawler?

- Just like a web crawler it crawls as much data as it can
- To circumvent sizelimits a crawler does not do subtree searches, but one level searches
- They follow all referrals and can start crawling the whole naming context of the referred to server
- They could use DNS SRV records to find additional servers
Good or bad?

➢ Thus crawlers can be a threat
  ▪ when used by bad people, like spammers
  ▪ But only on a public server with anonymous access
  ▪ Or they could even hack non public servers
➢ From privacy perspective there is a difference between
  ▪ reading single public entries and
  ▪ If it stills hits a size or time limit, it can do partial searches like (cn=a*), (cn=b*), etc.
    • If it still hits a limit, it can do (cn=aa*), (cn=ab*), etc.
      – And so on ...
  ▪ getting all the data into one file
➢ Crawlers can be usefull though, e.g. in an indexing context
Who uses crawlers?

- By now crawlers are mostly used by „good people“ that work on indexing services
- Sometimes web crawlers hit a web2LDAP gateway and get data
- I have not yet seen an LDAP crawler that was used by a spammer
  - E.g.: the email directory for the German research community (AMBIX, ambix2002.directory.dfn.de)
    - we store fake entries
    - with working email-addresses
    - that were never published elsewhere
  - We never got any spam at those email addresses!
- This might change in future!!!
So what can be done against that threat?

- To distinguish between „good“ and „bad“ crawlers
  - we should use a similar approach as in the Web: robots.txt
  - Crawler policy tells the crawler which behaviour is wanted and which is not
  - LDAP crawler policy should be stored in the LDAP server
- To block „bad“ crawlers that don’t care about the policy, we additionally need crawler detection
Crawler policy proposal

- Originally part of the specs of the SUDALIS crawler (a crawler developed by DAASI for Surfnet)
- Implementation of crawler policy is on its way
- Strategy was to have a very flexible way to define policy
- The current proposal is quite old and may need a little renovation since a lot has changed in the LDAP world since then
- I didn’t have time yet to do this update
- Your comments are most welcome
- I will put the specs document online
Root DSE Attributes

( sudalis-attributetypes.1
  NAME 'supportedCrawlerPolicies'
  EQUALITY objectIdentifierMatch
  SYNTAX numericOID
  USAGE directoryOperation )

➢ Just in case that there will be different crawlerpolicy formats
Root DSE Attributes contd.

( sudalis-attributetypes.2
NAME 'indexAreas'
EQUALITY distinguishedNameMatch
SYNTAX DN
USAGE directoryOperation )

- Pointer to the subtrees that are to be indexed
- All other parts of the DIT are to be ignored by the crawler
- If this attribute is empty, the naming contexts are crawled instead
Object class indexSubentry

( sudalis-objectclasses.1
NAME 'indexSubentry'
DESC 'defines index crawler policy'
SUP TOP
STRUCTURAL
MUST ( cn )
MAY ( indexCrawlerDN $
     indexCrawlerAuthMethod $
     indexObjectClasses $ indexAttributes $
     indexFilter $ indexAreaLevels $
     indexCrawlerVisitFrequency $
     indexDescription ) )

➤ These entries specify the policy
➤ Alternative could be SUP subentry
Attribute Type indexCrawlerDN

( sudalis-attributetypes.3
NAME 'indexCrawlerDN'
EQUALITY distinguishedNameMatch
SYNTAX DN )

# USAGE directoryOperation

- Defines for which crawler(s) this policy is meant
- Several subentries for different crawlers
- If this attribute is empty, the policy is meant for all crawlers
- If not empty, the crawler has to bind with this DN
Attribute Type  `indexCrawlerAuthMethod`

( sudalis-attributetypes.4
NAME `indexCrawlerAuthMethod`
SYNTAX directoryString
EQUALITY caseIgnoreMatch )
# USAGE directoryOperation )

- Defines the authentication method the crawler has to use
Attribute Type indexObjectClasses

( sudalis-attributetypes.5
  NAME 'indexObjectClasses'
  SYNTAX OID
  EQUALITY objectIdentifierMatch )
# USAGE directoryOperation )

- Defines which objectclass attribute values to include in the index.
- No Filter criteria!
- Models the LDIF entry that is to be put into the index
- Needed to prevent the crawler from storing internal objectclasses into the index
Attribute Type  indexAttributes

( sudalis-attributetypes.6
NAME 'indexAttributes'
SYNTAX OID
EQUALITY objectIdentifierMatch )
# USAGE directoryOperation )

Defines which attributes to crawl.
The crawler must not take any other attributes
Attribute Type indexFilter

( sudalis-attributetypes.7
NAME 'indexFilter'
SYNTAX directoryString
EQUALITY caseExactMatch
SINGLE-VALUE )
# USAGE directoryOperation )

- Filter that MUST be used by the crawler
Attribute Type indexAreaLevels

( sudalis-attributetypes.8
NAME 'indexAreaLevels'
SYNTAX INTEGER
EQUALITY integerMatch
SINGLE-VALUE )
# USAGE directoryOperation )

- Number of hierarchy levels to crawl
- If 0 the crawler MUST leave this subtree of the DIT
- If empty no restrictions for the crawler as to the depth
Attribute Type indexCrawlerVisitFrequency

( sudalis-attributetypes.9
NAME 'indexCrawlerVisitFrequency'
SYNTAX INTEGER
EQUALITY integerMatch
SINGLE-VALUE )
# USAGE directoryOperation )

- defines how often the data of the specified subtree are to be crawled
- The value represents a time period in seconds
- The crawler MAY crawl less frequent
- but MUST NOT crawl more frequent than stated here
Attribute Type indexDescription

( sudalis-attributetypes.10
NAME 'indexDescription'
SYNTAX directoryString
EQUALITY caseExactMatch
SINGLE-VALUE )
# USAGE directoryOperation )

➢ Human readable description of the policy defined in the subentry
Crawler Policy and Access control

- Crawler policy is interpreted by client
- Access control is interpreted by server
- Access control should be used to enforce crawler policy
Crawler registration

- A crawler can register to a server by providing the following data:
  - Name of the Crawler
  - Description of the index the crawler collects data for
  - URI where to access the index
  - Pointer to a privacy statement about how the data will be used. This statement should comply to the P3P standard (http://www.w3.org/P3P/)
  - Email address of the crawler manager
  - Method and needed data (public key) for encrypted email (PGP or S/MIME)
Crawler registration contd.

- The data from the crawler will be entered in a dedicated entry, together with additional information:
  - Date of registration
  - Pointer to the person who made the decision
  - Date of last visit of the crawler
  - ...
  - Password

- This entry will be used for the indexCrawlerDN
Crawler Detection

- So what about not conforming crawlers?
- They have to be detected on the server side.
- If crawler detection has no success this might be the end of public directories
Crawler characteristics

- IP address can be used for identification
- Regular requests over a certain period of time
- Humans are slower, so more than X requests per 10 seconds must be a crawler
- Patterns in searching:
  - One-level search at every entry given back in the former result
  - "(cn=a*)", etc.
- Known Spammer IPs could be blocked
- Known spamming countries could be blocked as well
The further future

- What if intelligent crawlers will try to hide their characteristics?
  - Random sleep in between requests
  - ...

- How public should this discussion take place?
- What else could we do?
- Ideas wanted and needed!
- Even more needed: Implementation of simple crawler detection as describe above in OpenLDAP!
BTW: Schema Registry Project update

- Work almost finished
- BarBoF Meeting at the IETF, deciding:
  - Either publish old drafts as RFC
  - Or Chris and Peter work on the drafts before to resolve some issues
  - There is currently no need for a new WG
- Project Web-site now is: www.schemareg.org
  - Service still experimental
  - Pilot service will start beginning of August
- Last document on business modell will come soon too
Thanks for your attention 😊

- Any Questions?

- More info at:
  - Info@daasi.de