3 Creation of repository artefacts

Content Management and in particular Case Management will requirement multiple metadata. On customer projects I have experienced that the generation of such meta data could be done using the tools on the Objectstore or using the implicit generation when using Case Builder as your tool. So it would be great to have a common view onto the Objectstore regardless how a meta data field has been created.

3.1 Generating artefacts

An Objectstore contains many property templates and many classes.

Property Templates can be created by:

- Manually in ACCE
- Case Builder
- By product installations
- By addons
- Deployment Manager
- Configuration Manager jobs
- P8Toolkit as part of manual jobs
- P8Toolkit as part of UCD deployments

It is a good idea to use the category system field to tag the various artefacts for its purpose.
There should be a document describing the data model from a solution perspective.
It is mainly important to manage the dependencies between artefacts being created outside of CaseBuilder and in CaseBuilder. Translation might be still a challenge from within CaseBuilder.

3.2 Stable GUIDs

There is a concept, that every artefact should have the same global identifier in each stage so that dependent artefacts like folders, searches etc. are still referring to the correct artefacts. This simplifies the situation when transporting artefacts from stage to stage, it is imperative to use the same IDs. In particular this is important when creating an Objectstore using the tools instead if the API, where you could change the GUID at creation time.

FileNet Deployment Manager is using exactly this concept to transport the artefacts between stages.

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3.3 Configuring Search behavior

In the screenshot below you can see how to set the behavior of case insensitive searches using ACCE:

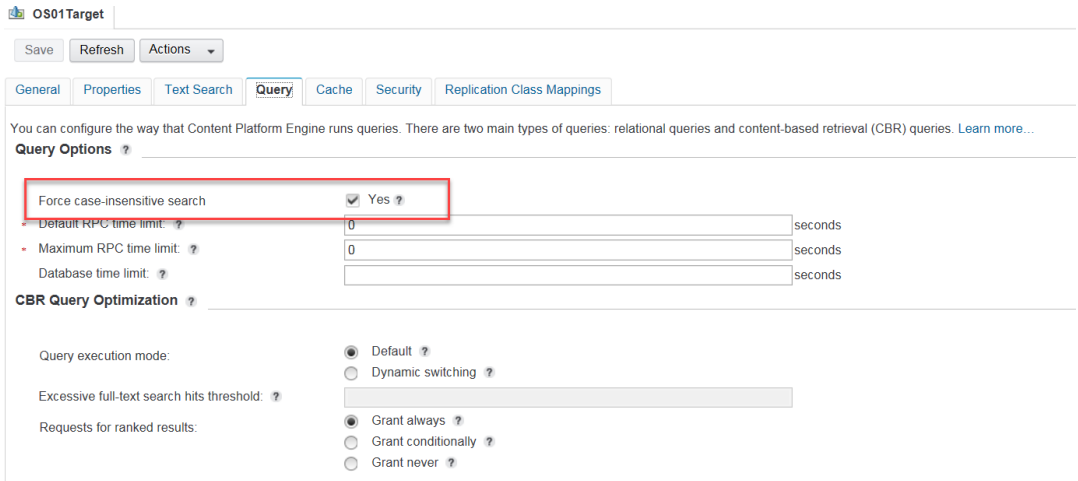


FIGURE 3: CASE INSENSITIVE SEARCHES

This means, all string comparisons are formulated by the Content Platform Engine as `lower(search_argument) = lower(string_value)`
This implies that there are functional database indices created of the form `lower(uxy_propertytemplate)`.
There is a dependency between the symbolic_name and the implemented database column name which may vary between stages (dev/test/…prod). This enforces us to work with symbolic_names in logical index creation scripts which can then be leveraged to produce stage depended SQL-ddl files for the index creations

The database column name can be either queried from the Objectstores repository or through the API.

For people who are interested I can share a utility which allows to create the DDL for index creation based on symbolic names of the property templates and the symbolic name of the class.

e.g.

```
create index #DBSCHEME#DBSCHEME#.I_docv_docdate on
#DBSCHEME#DBSCHEME#.docversion(##DocClass#,object_id)@
```

will get translated into:

```
create index obj1.I_docv_docdate on obj1.docversion(u0ec8_subject,object_id
)@
```

4 Queries

Queries can be executed from:

- ACCE (Adhoc or saved)
- custom programs
- search templates in Navigator
- ..

It is often hard to understand who is executing what kind of query. As a best practice following recommendations can be made:

- Document every custom query
- Do not embed queries in Java Code but externalize the queries and define a queryID.
- Mark the query technically:

```
AND creator <> 'QueryId: Query123'
```

The attribute creator is available on all kind of objects like folders, document classes and custom objects

The additional where clause is not changing the query and the optimizer should not be irritated because the creator is not really a very selective attribute.

```
SELECT [This], [DocumentTitle], [DocState], [EAGSNR], [DateCreated],
[MajorVersionNumber], [MimeType], [Id] FROM [DOCCLASSX] WHERE [DossierNr] =
959614 AND [IsCurrentVersion] = true AND [EAGSNR] is not null

AND creator <> 'QueryId: Query123'

ORDER BY DateCreated ASC
```

Adapt all Custom CE Queries and apply such behavior with the creator clause and a queryId

5 Testing – Single User Tests

Whenever a query from a use case is ready for testing, allow some time on a FileNet Content Manager server where there is no additional traffic from other users. This means, try to get exclusive access to this machine and switch on tracing.
In a multi node cluster, stop all but one server to simplify searching the relevant trace from only 1 and not from all possible log files.
If you know that you can generate a queryID which is absolutely unique, it may as well work in an environment where you are not granted exclusive access to the CPE server.

5.1 Instrumentation

5.1.1 CE Traces

With the instrumentation of the CE Traces, it is possible to show activities on various interfaces. Typically, only the database layer is of relevance.

Tracing can be switched on according to following documentation
http://www-01.ibm.com/support/docview.wss?uid=swg21308282
The subsystems which might be useful are:
https://www.ibm.com/support/knowledgecenter/en/SSNW2F_5.5.0/com.ibm.p8.common.admin.doc/logs/cpe_logging_concepts.htm

- DatabaseTraceFlags (this shows the jdbc sql, the inbindings and the execution time)
- SearchTraceFlags (this shows the notation which can be used in ACCE fro replays)

5.1.2 Database Traces

With the instrumentation of the database it is much easier to understand the effective costs. With the trick of applying a binding variable creator and its value, it is fairly easy for the DBA to search for a particular query. In cases where this is not possible the CE Trace will include the SQL syntax of the database. The dba can search for the query text.
For details consult the Oracle dba.

5.2 Analysis

Document the use case, the CE trace and the execution plan from the database.

5.2.1 Analysis of the CE Trace

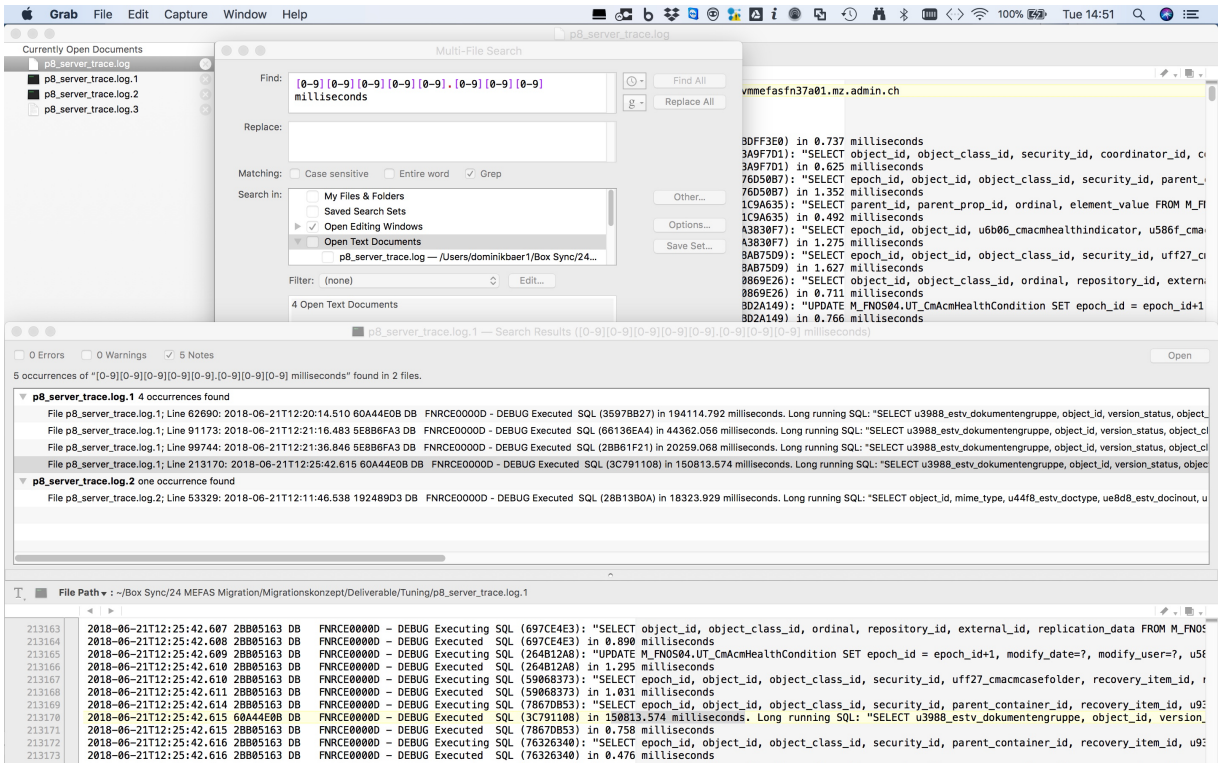


FIGURE 4: ANALYSIS OF CE-TRACES

With the help of notepad++ (Windows) or Textwrangler (Mac) the trace files can be easily searched for the queryID or for long running queries. Depending on what you are looking for a search pattern like

`[0-9][0-9][0-9][0-9][0-9].[0-9][0-9][0-9] milliseconds` might be useful.

5.3 Tuning

For every query which results in a full table scan, consider creating an appropriate database index.

Allow more time to build up a query inventory and document the query behavior according to the suggested points in this chapter.

6 Testing - Mass Tests / Loadtests

6.1 Instrumentation

Dba will extract a list of expensive queries.

Multiple long running SQL Queries can be found as well by some monitors.

DB_NAME	Applikation	ORDER	USER_NAM	ELAPSED_SEC	EXECUTIONS	Executiontime per run	Not acceptable	DISK_READ	CPU_SEC	PHYSICAL_READ_MB	PHYSICAL_I	SQL_ID	DETAILS	SQL_TEXT
PFITFN05		ELAPSED		1440	20'573'505.00	0.000069992935	-	1	658	0.01	0	24u9n48b8x	Detail	SELECT T0.(
PFITFN05		ELAPSED		2397	14'074'198.00	0.000170311658	-	9271	1072	72.44	0	c0p9qa3nvat	Detail	SELECT epo
PFITFN05		ELAPSED		1574	1'243'674.00	0.001265604974	-	226870	231	1438.41	0	3bk9z2z8by	Detail	INSERT INT(
PFITFN05		ELAPSED		621	544'814.00	0.001139838550	-	254140	86	1985.54	0	3xmbdqh1j9	Detail	SELECT epo
PFITFN05		ELAPSED		1198	392'890.00	0.003049199521	-	384	602	3	0	bvun6tq7qnx	Detail	SELECT par(
PFITFN05		ELAPSED		524	66'424.00	0.007888714922	-	83544	27	652.31	0	ghuqkw9fxd	Detail	INSERT INT(
PFITFN05		ELAPSED		625	16'560.00	0.037741545894	-	102397	165	776.42	312.98	g49u1uyu17	Detail	INSERT INT(
PFITFN05		ELAPSED		1434	13'810.00	0.103837798697	-	150331	376	1174.46	1004.56	a8qw766fpn	Detail	INSERT INT(
PFITFN05		ELAPSED		4030	7'837.00	0.514227382927	1	138	1	1.08	0	a9uanxffv05	Detail	SELECT last
PFITFN05		ELAPSED		2459	4'168.00	0.589971209213	1	6	1348	0.05	0	gx9ujkacxp1	Detail	SELECT epo
PFITFN05		ELAPSED		596	2'541.00	0.234553325462	-	195350	19	1526.17	0	20xwwgfx2g	Detail	SELECT epo
PFITFN05		ELAPSED		1014	1'725.00	0.587826086957	1	5	546	0.04	0	fm9z8bbq21	Detail	SELECT obje
PFITFN05		ELAPSED		2384	667.00	3.574212893553	1	274712	83	2146.19	0	1yzn5rss1m	Detail	INSERT INT(
PFITFN05		ELAPSED		442	254.00	1.740157480315	1	52426	25	0	0	614d2z99b0	Detail	UPDATE M_I
PFITFN05		ELAPSED		648	21.00	30.857142857143	1	2	46	6748.02	0	8zyjczrdnpa	Detail	select /*NOR

FIGURE 5: TOP SQL, LONGRUNNING SQL STATEMENTS

Long running SQL Queries can be found with various database tools. Figure above shows the `elapsed_sec` and `Physical_READ_MB`. From these two key performance indicators the average execution time and the average number of physical reads per execution can being derived.
As a rule of thumb execution time higher than 500 – 1000ms are candidates for long running queries. Depending on its frequency they should be optimized.
From a perspective of I/O physical reads greater than multiple 100 MB are as well candidates for slow performers.
Regarding documents being stored in the database. If documents are stored in the database, a query which is delivering content must be identified from its SQL_TEXT. It reads from a table "content". The high costs in physical reads are typically being produced by tables scans instead of index seek or index range scans.

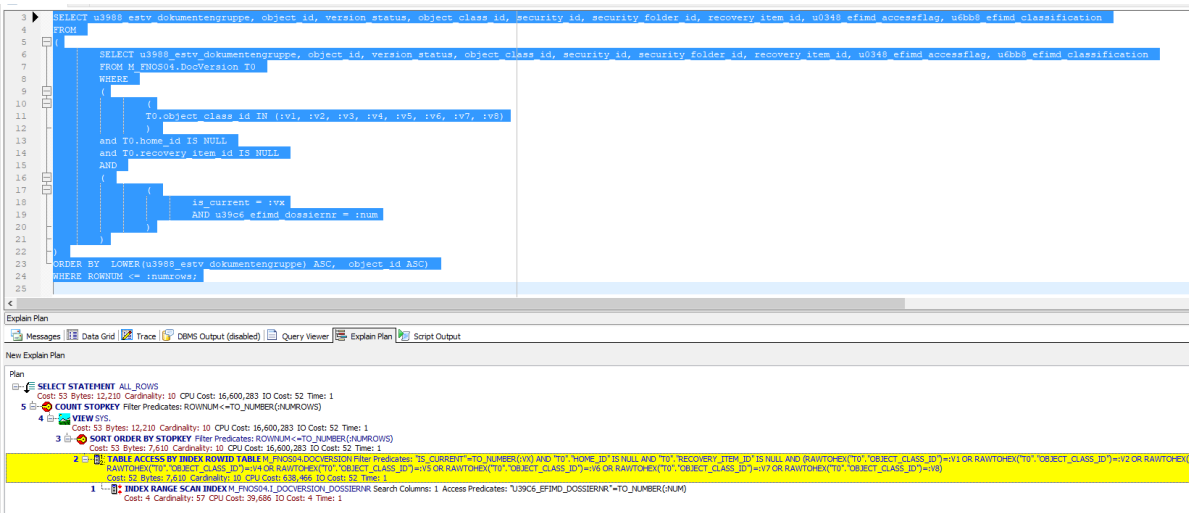
6.2 Analysis

The extracted text must be manually reformatted resp. toad has such editor capabilities

```
FNRCE0000D - DEBUG Executed  SQL (3597BB27) in 194114.792 milliseconds. Long running SQL: "
SELECT u3988_dokumentengruppe, object_id, version_status, object_class_id, security_id, security_folder_id,
recovery_item_id, u0348_accessflag, u6bb8_classification FROM (SELECT        u3988_dokumentengruppe, object_id,
version_status, object_class_id, security_id, security_folder_id, recovery_item_id, u0348_accessflag,
u6bb8_classification
FROM M_FNOS04.DocVersion T0
WHERE
(
                        (
                        T0.object_class_id IN (?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?)
                        )
        and T0.home_id IS NULL
        and T0.recovery_item_id IS NULL
        AND
        (
                (
                 is_current = ?
                AND LOWER(u44f8_doctype) <> LOWER(?)
                AND
                (
                        LOWER(udec8_partnerid) = LOWER(?)
                        OR u69d7_cmacmassociatedcase IN
                                (
                                        SELECT  T1.object_id FROM M_FNOS04.Container T1
                                        WHERE
                                         (
                                                (
                                                        T1.object_class_id IN (?, ?, ?, ?, ?)
                                                )
                                                and T1.home_id IS NULL
                                                and T1.recovery_item_id IS NULL
                                                AND
                                                (
                                                        LOWER(T1.udad8_estv_partnerid) = LOWER(?)
                                                )
                                        )
                                )
                        )
                )
        )
)
ORDER BY  LOWER(u3988_estv_dokumentengruppe) ASC,  object_id ASC)
WHERE ROWNUM <= ?
" In-bindings: ({4EADED59-2170-4606-91F5-704C4653D373},{809DBBC2-B032-4F6C-B697-AECCF9F8EDF9},{9640BF23-1B7E-4C2F-8B1A-
FF213D619E32},{BADAE424-9DF4-42DC-980E-B00293645C6C},{0DDF01DA-DEF9-4639-9C72-B9268A0B5745},{22E3FF1D-6A0A-4F0B-88D9-
949172939A9C},{BBF92363-945B-427E-BBD9-E636F31FC511},{223AA027-CA30-4E86-9395-E6E2D0C46B3E},{1B3F1C5E-C5FD-40F9-A5F3-
5585F2F3CEA0},{B242F976-CE4B-4576-A0BC-293F3A433029},{72C6E23F-2AA8-48E4-9583-93C3409F8F10},{B5B06FA1-BBB3-461C-9243-
946D9BFE0720},{3C496105-D4EC-4463-B8EE-70957F50F0E2},{00151BA6-E80E-4C6F-8E4F-8778550163CF},{F40BBAD5-7A97-4BFF-A70D-
60D588A6FCB4},{904EAEE4-01F7-47E8-89EE-D6C971E81860},{C9776F9B-1AA9-4226-AED7-755577D9E3EA},{55904B14-44DD-4D47-8EAC-
4FC9B8677790},{D6872636-EA8B-42E2-9B76-F79C67B6B5FE},{804D49AC-8508-4CE9-B792-ECB4C6A0E798},{B03AD059-0000-CB18-8EF4-
A4CFD4071C38},true,'Request','5202238491',{0B0CD12E-23B4-4E09-B7DD-8D63B910C5EE},{79AAA9BA-C744-4840-AE0A-
96D2CE35EBE8},{E7DF4579-0E65-4A8C-9AD3-FA93B32C3606},{758DD48F-78A9-4B32-B047-3C55CF0D095C},{3D269935-0ADE-4C59-81D7-
9CD5FEE3EFEA},'5202238491',1000)
2018-06-21T12:20:14.510 2BB05163 DB
```

This gives a better overview and allows to understand what kind of where clauses and order by statements are generating a certain cost.

With the database tools it is possible to generate a graphical representation of the execution plan:



Monitor the performance on the productive database monthly and take actions.

7 Documentation

- Document all searches from a logical point of view (user, application, …)
- Map them to search templates or to applications and its code.
- If possible do not create the queries in the Java code but externalize the SQL (PseudoSQL) in a textfile which allows the tuning independendly from a release/deployment.
- Add the additional filter condition with a query identifier
- Run the query using ACCE and document the execution plan on the database.
- Document all indices on the relevant tables and save the DDL for these as part of the release/deployment package
- Decide which property templates are not used anymore. Get rid of these indices.

7.1 Table - Docversion

Index on documenttitle was created before the deployment.

```
CREATE INDEX M_FNOS04.idx_cmp ON M_FNOS04.docversion (object_class_id, LOWER(udec8_partnerid), object_id) tablespace
TS_FNOS04_INDEX compress 2 parallel 4 nologging;
alter index M_FNOS04.idx_cmp noparallel logging;
```

7.2 Table - Container

```
CREATE INDEX "M_FNOS04"."AI_UDEC8_PARTNERID_C_O" ON "M_FNOS04"."CONTAINER" (LOWER("UDAD8_PARTNERID"), object_id)
tablespace "TS_FNOS04_INDEX" compress 2 parallel 4 nologging;
alter index "M_FNOS04"."AI_UDEC8_ESTV_PARTNERID_C_O" noparallel logging;
```

7.3 Table - Task

```
create index "M_FNOS04"."U8B88_ESTV_INFOCARRIERI" on "M_FNOS04"."TASK" (lower(U8B88_ESTV_INFOCARRIERINSTANZI), object_id)
tablespace "TS_FNOS04_INDEX" compress 2 parallel 4 nologging;
alter index "M_FNOS04"."U8B88_ESTV_INFOCARRIERI" noparallel logging;
```