

# The l3pdfmanagement package

## Managing central PDF resources

The L<sup>A</sup>T<sub>E</sub>X3 Project\*

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### 1 l3pdfmanagement documentation

When creating a pdf a number of objects, dictionaries and entries to central “core” dictionaries must be created.

The commands in this module offer interfaces to this core PDF dictionaries. They unify a number of primitives like the pdf<sub>tex</sub> registers and commands `\pdfcatalog`, `\pdfpageattr`, `\pdfpagesattr`, `\pdfinfo`, `\pdfpageresources` and similar commands of the other backends in a backend independent way.

The supported backends are pdf<sub>latex</sub>, lua<sub>latex</sub>, (x)dvipdfmx (l<sub>at</sub>ex, xel<sub>at</sub>ex) and dvips with ps2pdf (not completely yet). dvips with distiller could work too but is untested.

That the interfaces are backend independent doesn’t mean that the results and even the compilation behavior is identical. The backends are too different to allow this. Some backends expand arguments e.g. in a `\special` while other don’t. Some backends can insert a resource at the first compilation, while another uses the aux-file and a label and so needs at least two. Some backends create and manage resources automatically which must be managed manually by other backends.

The dictionaries and resources handled by this module are inserted only once in a PDF or only once per page. Examples are the Catalog dictionary, the Info dictionary, the page resources. For these dictionaries and resources management by the L<sup>A</sup>T<sub>E</sub>X kernel is necessary to avoid that packages overwrite settings from other packages which would lead to clashes and incompatibilities. It is therefore necessary that all packages which want to add content to this dictionaries and resources use the interface provided by this module.

As these dictionaries and resources are so central for the PDF format values to these dictionaries are always added globally. Through the interface values can be added (and in many cases also removed) by users and packages, but the actually writing of the dictionary entries and resources to the PDF is handled by the kernel code.

The interface uses as main name to address the resources *Pathes* which follow the names and structure described in the PDF reference. This should make it easy to identify the names needed to insert a specific PDF resources with the new interfaces. All *Pathes* have names starting with an uppercase letter.

The following tabular summarize the *Pathes* and which pdf<sub>tex</sub> primitive they replace:

---

\*E-mail: [latex-team@latex-project.org](mailto:latex-team@latex-project.org)

Info	<code>\pdfinfo</code>
Catalog & various subdictionaries	<code>\pdfcatalog</code>
Pages	<code>\pdfpagesattr</code>
Page, ThisPage	<code>\pdfpageattr</code>
Page/Resources/ExtGState	<code>\pdfpageresources</code>
Page/Resources/Shading	<code>\pdfpageresources</code>
Page/Resources/Pattern	<code>\pdfpageresources</code>
Page/Resources/ColorSpace	<code>\pdfpageresources</code>

There is no `Page/Resources/Properties` dictionary in the list as this dictionary is not filled directly but managed through side effects when setting BDC-marks.

## 1.1 User Commands

To avoid problems with older documents the resource management of this module is not activated unconditionally. The values are pushed out to the dictionaries only if a boolean has been set to true. The state can be tested with a conditional.

---

```
\pdfmanagement_if_active_p: *
\pdfmanagement_if_active:TF *
```

---

New: 2020-07-04

This conditional tests if the resource management code is active.

---

```
\pdfmanagement_add:nnn \pdfmanagement_add:nnn {\resource path} {\name} {\value}
```

---

New: 2020-04-06

This function puts `{\name} {\value}` in the PDF resource described by the symbolic name `{\resource path}`. Technically it stores it globally in an internal property lists and writes it later into the right PDF dictionary<sup>1</sup>. Which values for `{\resource path}` exist is described in the following. `{\name}` should be a valid PDF Name without the starting slash. `{\value}` should be a valid PDF value for this Name in the target dictionary.

The code works with all major engines but not necessarily in the same way. Most importantly

- The expansion behaviour of the backends can differ. Some backends expand a value always fully when writing to the PDF, with other backends command names could end as strings in the PDF. So one should neither rely on `{\name} {\value}` to be expanded nor not expanded by the backend commands.
- The number of compilations needed can differ between the engines and backends. Some engines have to use labels and the aux-file to setup the dictionaries and so need at least two compilations to put everything in place.

---

```
\pdfmanagement_show:n \pdfmanagement_show:n {\resource path}
```

---

New: 2020-04-08

This shows the content of the dictionary targetted by `{\resource path}` in the log and on the terminal if possible.

It is not reliable for page resources as these are filled at shipout.

It also doesn't show necessarily all the content. For example most backends add automatically entries to the Info dictionary.

---

<code>\pdfmanagement_remove:nn</code>	<code>\pdfmanagement_remove:nn {&lt;resource path&gt;} {&lt;name&gt;}</code>
---------------------------------------	--

---

New: 2020-04-07

Removes `/<name>` and its associated `<value>` from the dictionary described with `{<resource path>}`. The removal is global. If `<name>` is not found no change occurs, *i.e.* there is no need to test for the existence of a name before trying to remove it. Values from the special Catalog entries where the values are collected in arrays can't be removed (but should ever a use case appear it could be added).

## 1.2 Description of the resource pathes

### 1.2.1 Info: The Info dictionary



If the primitive commands of the engines are used too there will be double entries in the pdf (at least with the backend pdfTeX and LuaTeX). How pdf viewer handles this is unpredictable.

---

<code>pdfmanagement: Info</code>	<code>\pdfmanagement_add:nnn {Info} {&lt;name&gt;} {&lt;value&gt;}</code>
----------------------------------	---

---

Adds `/<name>` and the `<value>` to the Info dictionary. `<name>` should be a valid pdf name without the leading slash, `<value>` should be a valid pdf value. Any escaping or (re)encoding must be done explicitly. If a `<name>` is used twice, only the last `<value>` set will be used. The Info dictionary is written at the end of the compilation, so values can be set at any time. The Info dictionary expects utf16be in the strings, so a conversion like this is normally sensible:

```
\sys_if_engine_pdfTeX:TF
{
  \str_set_convert:Nnnn \l_tmpa_str { Grüße }{ utf8 } {utf16/string}
}
{
  \str_set_convert:Nnnn \l_tmpa_str { Grüße }{ } {utf16/string}
}
\pdfmanagement_add:nnx {Info} {Title}{(\l_tmpa_str)}
```

### 1.2.2 Pages: The “Pages” dictionary



As the content of this dictionary is written at the end it will in pdfTeX and LuaTeX overwrite values added with the primitive commands (e.g. `\pdfpagesattr`. Package authors should use the management commands instead.

By using this path with the pdfmanagement interface, values can be added to the /Pages object. This replaces for example `\pdfpagesattr`.

---

<code>pdfmanagement: Pages</code>	<code>\pdfmanagement_add:nnn {Pages} {&lt;name&gt;} {&lt;value&gt;}</code>
-----------------------------------	--

---

Adds `/<name>` `<value>` to the /Pages dictionary. It is always stored globally. The content is written to the pdf at the end of the compilation, so values can be added, changed or removed until then. `<name>` should be a valid pdf name without the leading slash, `<value>` should be a valid pdf value. Any escaping or (re)encoding must be done explicitly. Some backends expand the value but this should not be relied on. If a `<name>` is used twice, only the last `<value>` set will be used.

### 1.2.3 “Page” and “ThisPage”

<hr/> <b>pdfmanagement:</b> <b>Page</b>	\pdfmanagement_add:nnn {Page} {\langle name \rangle} {\langle value \rangle}
<hr/> <b>New:</b> 2020-04-12	<p>Values added with the path <b>Page</b> are added to the page dictionary of the current page and the following pages. The current page means the page on which the command is <i>executed</i>. <i>\langle name \rangle</i> should be a valid pdf name without the leading slash. Typical names used here are e.g. <b>Rotate</b> and <b>CropBox</b>. <i>\langle value \rangle</i> should be a valid pdf value. Any escaping or (re)encoding must be done explicitly. Some backends expand the value but this should not be relied on. To avoid problems with the asynchronous page breaking the command should be used after <b>\newpage</b> or in the header. It should not be used in a float, as it will then quite probably be executed on the wrong page. The value is assigned directly and is always stored globally. If a <i>\langle name \rangle</i> is used twice, only the last <i>\langle value \rangle</i> set will be used. Names set with <b>\pdfmanagement_add:nnn{ThisPage}</b> will overwrite names set with <b>\pdfmanagement_add:nnn{Page}</b> if there is a clash. Values can be removed again with <b>\pdfmanagement_remove:nn</b>. This replaces <b>\pdfpageattr</b>.</p>
<hr/> <b>pdfmanagement:</b> <b>ThisPage</b>	\pdfmanagement_add:nnn {ThisPage} {\langle name \rangle} {\langle value \rangle}
<hr/> <b>New:</b> 2020-04-12	<p>Adds <i>/\langle name \rangle \langle value \rangle</i> at <i>shipout</i> to the page dictionary of the current page. Current page means here the <i>shipout</i> page. It is always stored globally. If <i>\{\langle name \rangle\}</i> has already a value set in the <b>Page</b> dictionary it will be overwritten for this page. <i>\langle name \rangle</i> should be a valid pdf name without the leading slash, <i>\langle value \rangle</i> should be a valid pdf value. Any escaping or (re)encoding must be done explicitly. If a <i>\langle name \rangle</i> is used twice, only the last <i>\langle value \rangle</i> set will be used. With the engine pdf<sub>l</sub>atex (at least) a second compilation is needed. Values added to <b>ThisPage</b> can not be removed. It is not possible to show the content of this dictionary with <b>\pdfmanagement_show:n</b>.</p>

## 1.2.4 “Page/Resources”: ExtGState, ColorSpace, Shading, Pattern

---

```
pdfmanagement: Page/Resources/ExtGState \pdfmanagement_add:nnn {Page/Resources/<resource>} {<name>}
pdfmanagement: Page/Resources/ColorSpace {<value>}
pdfmanagement: Page/Resources/Shading
pdfmanagement: Page/Resources/Pattern
```

---

Updated: 2020-04-10

---

Adds `/<name> <value>` to the page resource `<resource>`. `<resource>` can be **ExtGState**, **ColorSpace**, **Pattern** oder **Shading**. The values are always stored globally. The content is written to the pdf at the end of the compilation, so values can be added until then. `<name>` should be a valid pdf name without the leading slash, `<value>` should be a valid pdf value for the resource. Any escaping or (re)encoding must be done explicitly. If a `<name>` is used twice, only the last `<value>` set will be used.

With the dvips backend the command does nothing: these resources are managed by ghostscript or the distiller if e.g. transparency is used.

The resources are added to all pages starting with the first where something has been added to a resources. That means that for example all ExtGState resources are combined in one dictionary object and every page with a ExtGState resource refer to this object <sup>2</sup>.



The primitive commands (e.g. `\pdfpagemresources`) to set the resources should not be used together with this code as the calls will overwrite each other and values will be lost. This means that currently there are clashes with the packages `tikz`, `transparent` and `colorspace`.

## 1.2.5 “Catalog” & subdirectories

The catalog is a central dictionary in a PDF with a number of subdictionaries. Entries to the top level of the catalog can be added with `\pdfmanagement_add:nnn {Catalog}{<Name>}{<Value>}`. Entries to subdictionaries by using in the first argument one of the pathes described later. The entries in the catalog have varying requirements regarding the PDF management. Some entries (like `/Lang`) are simple values where new values should overwrite existing values, other like for example `/OutputIntents` can contain a number of values and can be filled from more than one source. In some cases the values that needs to be added are not at the top-level but in some subsubdictionary or are actually part of an array. To handle the pdf management uses a variety of internal, special handlers.



In some cases entries are added implicitly. For example entries to the name tree of the `/EmbeddedFiles` key in the `/Names` directory are added with the commands of the `l3pdffile` module. This clashes with e.g. the `embedfile` package which should not be used!

**Entries at the top level of the catalog** The Names in the following tabular are entries that are added to the top level of the catalog.

If `<Name>` gets assigned a value more than once the last one wins. There is no check that the values have the correct type and format. It is up to the user to ensure that the value does what is intended.

The required PDF version is only mentioned if it is larger than 1.5.

Example: `\pdfmanagement_add:nnn {Catalog}{PageMode}{/UseNone}`

Name	Value
Collection	objref or dict
DPartRoot	objref or dict
Lang	string
Legal	objref or dict
Metadata	objref or stream
NeedsRendering	boolean
OpenAction	array (dest) or dict
PageLabels	objref or dict
PageLayout	name

!!!!!!! Warning for unknown names is currently not working!

PageMode	name
Perms	objref or dict
PieceInfo	objref or dict
SpiderInfo	objref or dict
StructTreeRoot	objref or dict
Threads	objref to an array
URI	objref or dict
Version	name
<i>&lt;unknown&gt;</i>	

**Simple entries in subdictionaries of the catalog** The following resource pathes have been predeclared and allow to add values to the respective subdictionaries of the catalog. The names of the dictionaries follow the naming and location of the dictionaries in the PDF reference. If *<Name>* gets assigned two values the last one wins.

Example: \pdfmanagement\_add:nnn {Catalog/MarkInfo}{Marked}{true}

Path/dictionary	Names	Value	Remark
Catalog/AA	WC, WS, DS, WP,DP	all dict	
Catalog/AcroForm	NeedAppearances	boolean	In pdf 2.0 NeedAppearances
	SigFlags	Integer	
	DA	String	
	Q	Integer	
	XFA	stream or array	pdf 1.5
Catalog/AcroForm/DR	<i>&lt;name&gt;</i>		probably unneeded
Catalog/AcroForm/DR/Font	<i>&lt;name&gt;</i>	dict	
Catalog/MarkInfo	Marked	boolean	
	UserProperties	boolean	
	Suspects	boolean	
Catalog/ViewerPreferences	HideToolbar	boolean	
	Direction	/R2L or /L2R	
	...		many more, see the reference

**Catalog entries with multiple values in arrays** The following entries are special: Their values are arrays and it must be possible to append to such arrays. This means that a new call to set this value doesn't replace the value but appends it. The value is an object reference. It is sensible to declare the object first. E.g.

```
\pdf_object_new:nn {pkg@intent}{dict}
\pdf_object_write:nn {pkg@intent}{...}
\pdfmanagement_add:nxx {Catalog} {OutputIntents}{\pdf_object_ref:n {pkg@intent}}
```

or

```
\pdf_object_now:nn {dict} { ... }
\pdfmanagement_add:nxx {Catalog} {OutputIntents}{\pdf_object_last:}
```

Path/dictionary	Name	Value	Remark
Catalog/AcroForm	Fields	object reference	
Catalog/AcroForm	CO	object reference	
Catalog	AF	object reference	PDF 2.0, associated files
Catalog/OCProperties	OCGs	object reference	if there are OCProperties, OCGs and D are required.
Catalog/OCProperties	Configs	object reference	
Catalog/OCProperties	D	object reference	This is actually a single value as there can be only one default. If the value is set twice, the second wins, and the first is added to OCProperties/Configs.
Catalog	OutputIntents	object reference	
Catalog	Requirements	object reference	PDF 1.7
Catalog/Names	EmbeddedFiles	object reference	This should reference a filespec dictionary. It will attach the file to the file panel.

## 2 l3pdfmanagement implementation

```
1 <@@=pdfmanagement>
2 <*package>
3 %
4 \ProvidesExplPackage {l3pdfmanagement} {2020-04-08} {0.5}
5 {Main PDF Management}
```

### 2.1 Messages

```
6 \msg_new:nnn { pdfmanagement } { unknown-dict }
7 { The~PDF~management~resource~'#1'~is~unknown. }
8
9 \msg_new:nnn { pdfmanagement } { empty-value }
10 { The~value~for~#1~is~empty~and~will~be~ignored }
```

```

11
12 \msg_new:nnn { pdfmanagement } { no-removal }
13           { It-is-not-possible-to-remove-values-from-~'~#1'~.}
14
15 \msg_new:nnn { pdfmanagement } { no-show }
16           { It-is-not-possible-to-show-the-content-of-~'~#1'~.}
17
18 \msg_new:nnn { pdfmanagement } { show-dict }
19   {
20     The~PDF~resource-~'~#1'~
21     \tl_if_empty:nTF {#2}
22       { is-empty \>~ . }
23       { contains-the-pairs~(without-outer-braces): #2 . }
24   }
25 \msg_new:nnn { pdfmanagement } { dict-already-defined }
26   {
27     The~path-~'~#1'~is-already-defined.
28   }
29 \msg_new:nnn { pdfmanagement } { inactive }
30   {
31     The~PDF~resources~management~is~not~active\\
32     command~'~#1'~ignored.
33   }

```

`\g_pdfmanagement_active_bool` This boolean will control the activation of the management code. It is used in the hooks, and in some backend files. `\DeclareDocumentMetadata` should set it to true

```

34 \bool_new:N \g__pdfmanagement_active_bool

```

*(End definition for \g\_\_pdfmanagement\_active\_bool.)*

A user predicate to test if the management code is active

```

35 \prg_new_conditional:Npnn \__pdfmanagement_if_active: { p , T , F , TF }
36   {
37     \bool_if:NTF \g__pdfmanagement_active_bool
38       { \prg_return_true: }
39       { \prg_return_false: }
40   }
41 \prg_set_eq_conditional:NNn
42   \pdfmanagement_if_active: \__pdfmanagement_if_active: { p , T , F , TF }
43

```

We use a hook, to collect value added before the backend is ready.

```

44 \hook_new:n {pdfmanagement/add}
45 \cs_new_protected:Npn \pdfmanagement_add:nnn #1 #2 #3
46   {
47     \__pdfmanagement_if_active:TF
48     {
49       \pdfdict_if_exist:nTF { g__pdf_Core/#1 }
50       {
51         \hook_gput_code:nnn
52           {pdfmanagement/add}
53           {pdfmanagement}
54           {
55             \__pdfmanagement_handler_gput:nnn { #1 }{ #2 }{ #3 }
56           }
57       }

```



```

58         {
59             \msg_error:nnn{pdfmanagement}{unknown-dict}{#1}
60         }
61     }
62     {
63         \msg_warning:nnx {pdfmanagement}{inactive}{\tl_to_str:n {\pdfmanagement_add:nnn}}
64     }
65 }
66
67 \cs_generate_variant:Nn \pdfmanagement_add:nnn {nnx}

```

## 2.2 Hooks – shipout and end of run code

Code is executed in three places: At shipout of every page, at shipout of the last page, at the end of the document (after the last clearpage). Due to backend differences the code in the three places (and the exact timing) can be different: pdf<sub>l</sub>atex/lualatex can execute code after the last `\clearpage` which the dvi-based drivers have to add on a shipout page.

`pdf/management/end_run` This hooks contain the code run in the three places.

```

pdf/management/lastpage_shipout 68 \hook_new:n {pdf/management/end_run}
pdf/management/thispage_shipout 69 \hook_new:n {pdf/management/lastpage_shipout}
                                70 \hook_new:n {pdf/management/thispage_shipout}

```

(End definition for `pdf/management/end_run`, `pdf/management/lastpage_shipout`, and `pdf/management/thispage_shipout`. These variables are documented on page ??.)

```

71 \hook_gput_code:nnn {pdf/management/thispage_shipout} {pdf}
72 {
73     \bool_if:NT \g__pdfmanagement_active_bool
74     {
75         \exp_args:NV \__pdf_backend_ThisPage_gpush:n { \g_shipout_readonly_int }
76         \exp_args:NV \__pdf_backend_PageResources_gpush:n { \g_shipout_readonly_int }
77     }
78 }
79
80 \hook_gput_code:nnn {pdf/management/lastpage_shipout} {pdf}
81 {
82     \bool_if:NT \g__pdfmanagement_active_bool
83     {
84         \__pdf_backend_PageResources_obj_gpush: %ExtGState etc
85     }
86 }
87
88 \hook_gput_code:nnn {pdf/management/end_run} {pdf}
89 {
90     \bool_if:NT \g__pdfmanagement_active_bool
91     {
92         \__pdfmanagement_Pages_gpush: %pagesattr
93         \__pdfmanagement_Info_gpush: %pdfinfo
94         \__pdfmanagement_Catalog_gpush:
95     }
96 }

```

## 2.3 Naming convention

Currently the following names are used: All have internally additionally a `Core` before the slash, to hide the real name a bit.

```

/Info % (\pdfinfo)
/Catalog % (\pdfcatalog)
/Catalog/AA %
/Catalog/AcroForm
/Catalog/OCProperties
/Catalog/OutputIntents
/Catalog/AcroForm/DR
/Catalog/AcroForm/DR/Font
/Catalog/MarkInfo
/Catalog/ViewerPreferences
/Pages % (\pagesattr)
/Page % (\pageattr)
/ThisPage % (\pageattr)
/backend_PageN/Resources/Properties % this is only internal.
/Page/Resources/ExtGState
/Page/Resources/ColorSpace
/Page/Resources/Pattern
/Page/Resources/Shading
/Page/Resources/Properties
/Xform/Resources/Properties

```

```

__pdfmanagement_handler_gput:nnn \__pdfmanagement_handler_gput:nnn is the main command to fill the dictionaries. In
__pdfmanagement_get:nnN simple cases it directly fill the property list, but if a handler exists this is called. It is
__pdfmanagement_gremove:nn important to use it only in places where this make sense.
__pdfmanagement_show:n
97
98 %global
99 \cs_new_protected:Npn \__pdfmanagement_handler_gput:nnn #1 #2 #3 % #1 dict, #2 name, #3 value
100 {
101   \tl_if_empty:nTF { #3 }
102   {
103     \msg_none:nnn { pdfmanagement }{ empty-value }{ /#1/#2 }
104   }
105   {
106     \pdfdict_if_exist:nTF { g__pdf_Core/#1 }
107     {
108       \cs_if_exist:cTF
109       { __pdfmanagement_handler/#1/?_gput:nn } %general, name independant handler
110       { \use:c {__pdfmanagement_handler/#1/?_gput:nn} {#2} {#3} }
111       {
112         \cs_if_exist:cTF
113         { __pdfmanagement_handler/#1/#2_gput:n }
114         { \use:c {__pdfmanagement_handler/#1/#2_gput:n} {#3} } %special handler
115         {
116           \prop_gput:cnn
117           { \pdfdict_name:n { g__pdf_Core/#1 } }{ #2 } { #3 }
118         }
119       }
120     }
121   }

```

```

120     }
121     {
122         \msg_error:nnn { pdfmanagement } { unknown-dict } { #1 }
123     }
124 }
125 }
126
127
128 \cs_generate_variant:Nn \__pdfmanagement_handler_gput:nnn {nxx}
129
130 \cs_new_protected:Npn \__pdfmanagement_get:nnN #1 #2 #3 %path,key,macro
131 {
132     \prop_get:cnN
133     { \pdfdict_name:n { g__pdf_Core/#1 } }
134     { #2 } #3
135 }
136
137
138 \cs_new_protected:Npn \__pdfmanagement_handler_gremove:nn #1 #2 %path,key
139 {
140     \pdfdict_if_exist:nTF { g__pdf_Core/#1 }
141     {
142         \cs_if_exist:cTF
143         { __pdfmanagement_handler/#1/?_gremove:n } %general, name independant handler
144         { \use:c {__pdfmanagement_handler/#1/?_gremove:n} {#2} }
145         {
146             \cs_if_exist:cTF
147             { __pdfmanagement_handler/#1/#2_gremove: }
148             { \use:c {__pdfmanagement_handler/#1/#2_gremove:} } %special handler
149             {
150                 \prop_gremove:cn
151                 { \pdfdict_name:n { g__pdf_Core/#1 } }{ #2 }
152             }
153         }
154     }
155     {
156         \msg_error:nnn { pdfmanagement } { unknown-dict } { #1 }
157     }
158 }
159
160 \cs_new_protected:Npn \__pdfmanagement_gremove:nn #1 #2 %path,key
161 {
162     \pdfdict_if_exist:nTF { g__pdf_Core/#1 }
163     {
164         \prop_gremove:cn
165         { \pdfdict_name:n { g__pdf_Core/#1 } }{ #2 }
166     }
167     {
168         \msg_error:nnn { pdfmanagement } { unknown-dict } { #1 }
169     }
170 }
171
172
173 \cs_new_protected:Npn \__pdfmanagement_show:Nn #1#2

```

```

174 {
175   \cs_if_exist:cTF
176     { __pdfmanagement_handler/#2/?_show: } %general, name independant handler
177     { \use:c {__pdfmanagement_handler/#2/?_show:} }
178     {
179       \prop_if_exist:cTF { \pdfdict_name:n { g__pdf_Core/#2 } }
180       {
181         #1
182         { pdfmanagement } { show-dict }
183         { \tl_to_str:n {#2} }
184         { \prop_map_function:cN { \pdfdict_name:n { g__pdf_Core/#2 } } \msg_show_item:nn }
185         { } { }
186       }
187       {
188         #1 { pdfmanagement } { unknown-dict } {#2}{-}{-}{-}
189       }
190     }
191   }
192
193   \cs_new_protected:Npn \__pdfmanagement_show:n #1 %path
194   {
195     \prop_show:c { \pdfdict_name:n { g__pdf_Core/#1 } }
196   }
197
198   (End definition for \__pdfmanagement_handler_gput:nnn and others.)
199
200   \cs_new_protected:Npn \pdfmanagement_show:n #1
201   {
202     \__pdfmanagement_show:Nn \msg_show:nnxxxx {#1}
203   }
204
205   \cs_new_protected:Npn \pdfmanagement_remove:nn #1 #2
206   {
207     \pdfdict_if_exist:nTF { g__pdf_Core/#1 }
208     {
209       \__pdfmanagement_handler_gremove:nn { #1 } { #2 }
210     }
211     {
212       \msg_error:nnn{pdfmanagement}{unknown-dict}{#1}
213     }
214   }
215
216   \cs_new_protected:Npn \pdfmanagement_get:nnN #1 #2 #3
217   {
218     \pdfdict_if_exist:nTF { g__pdf_Core/#1 }
219     {
220       \__pdfmanagement_get:nnN { #1 } { #2 } { #3 }
221     }
222     {
223       \msg_error:nnn{pdfmanagement}{unknown-dict}{#1}
224     }
225   }

```

## 2.4 The Info dictionary

Initialization of the dictionary:

```
221 \pdfdict_new:n { g__pdf_Core/Info}
```

`\__pdfmanagement_Info_gpush:` `\__pdfmanagement_Info_gpush:` is the command that outputs the info dictionary (currently in the end-of-run hooks).

```
222 % push to the register command / issue the special
223 \cs_new_protected:Npn \__pdfmanagement_Info_gpush:
224 {
225   \prop_map_function:cN { \pdfdict_name:n { g__pdf_Core/Info} } \__pdf_backend_info_gput:n
226   \prop_gclear:c { \pdfdict_name:n { g__pdf_Core/Info} }
227 }
```

*(End definition for \\_\_pdfmanagement\_Info\_gpush:.)*

## 2.5 The Pages dictionary code

At first the initialisation

```
228 \pdfdict_new:n { g__pdf_Core/Pages}
```

`\__pdfmanagement_Pages_gpush:` This is the command that outputs the Pages dictionary. It is used at the end of the document in `\g__pdf_backend_end_run_tl`

```
229 % push to the register command / issue the special
230 \cs_new_protected:Npn \__pdfmanagement_Pages_gpush:
231 {
232   \exp_args:Nx \__pdf_backend_Pages_primitive:n
233   {
234     \pdfdict_use:n { g__pdf_Core/Pages}
235   }
236 }
237
```

*(End definition for \\_\_pdfmanagement\_Pages\_gpush:.)*

## 2.6 The Page and ThisPage dictionary

At first the initialisation.

```
238 \pdfdict_new:n { g__pdf_Core/Page }
239 \pdfdict_new:n { g__pdf_Core/ThisPage }
240
241 %handler for pdfmanagement
242 \cs_new_protected:cpn { __pdfmanagement_handler/Page/?_gput:nn } #1 #2
243 {
244   \__pdf_backend_Page_gput:nn { #1 } { #2 }
245 }
246 % remove:
247 \cs_new_protected:cpn { __pdfmanagement_handler/Page/?_gremove:n } #1
248 {
249   \__pdf_backend_Page_gremove:n { #1 }
250 }
251
252 % handler for pdfmanagement
253 \cs_new_protected:cpn { __pdfmanagement_handler/ThisPage/?_gput:nn } #1 #2
254 {
255   \prop_gput:cnn { \pdfdict_name:n { g__pdf_Core/ThisPage } } { #1 } { #2 }
```

```

256     \bool_if:NT \g__pdfmanagement_active_bool
257     {
258         \__pdf_backend_ThisPage_gput:nn { #1 }{ #2 }
259     }
260 }
261
262 \cs_new_protected:cpn { __pdfmanagement_handler/ThisPage/?_gremove:n } #1
263 {
264     \msg_warning:nnn { pdfmanagement } { no-removal }{ThisPage}
265 }
266
267 \cs_new_protected:cpn { __pdfmanagement_handler/ThisPage/?_show: }
268 {
269     \msg_warning:nnn { pdfmanagement } { no-show }{ThisPage}
270 }
271

```

## 2.6.1 “Page/Resources”: ExtGState, ColorSpace, Shading, Pattern

```

272 \clist_const:Nn \c__pdfmanagement_PageResources_clist
273 {
274     ExtGState,
275     ColorSpace,
276     Pattern,
277     Shading,
278 }
279
280 \clist_map_inline:Nn \c__pdfmanagement_PageResources_clist
281 {
282     \pdfdict_new:n { g__pdf_Core/Page/Resources/#1}
283 }
284 %
285 % setter: #1 is the name of the resource
286 \cs_new_protected:cpn { __pdfmanagement_handler/Page/Resources/ExtGState/?_gput:nn } #1 #2
287 {
288     \__pdf_backend_PageResources_gput:nnn {ExtGState} { #1 }{ #2 }
289 }
290
291 \cs_new_protected:cpn { __pdfmanagement_handler/Page/Resources/ColorSpace/?_gput:nn } #1 #2
292 {
293     \__pdf_backend_PageResources_gput:nnn {ColorSpace} { #1 }{ #2 }
294 }
295
296 \cs_new_protected:cpn { __pdfmanagement_handler/Page/Resources/Shading/?_gput:nn } #1 #2
297 {
298     \__pdf_backend_PageResources_gput:nnn {Shading} { #1 }{ #2 }
299 }
300
301 \cs_new_protected:cpn { __pdfmanagement_handler/Page/Resources/Pattern/?_gput:nn } #1 #2
302 {
303     \__pdf_backend_PageResources_gput:nnn {Pattern} { #1 }{ #2 }
304 }

```

## 2.6.2 “Catalog”

The catalog has mixed entries: toplevel, subdictionaries, and entries which must build arrays.

`\c__pdfmanagement_Catalog_toplevel_clist` This variables hold the list of the various types of entries. With it the various `_gput` commands are generated.  
`\c__pdfmanagement_Catalog_sub_clist`  
`\c__pdfmanagement_Catalog_seq_clist` *(End definition for \c\_\_pdfmanagement\_Catalog\_toplevel\_clist, \c\_\_pdfmanagement\_Catalog\_sub-clist, and \c\_\_pdfmanagement\_Catalog\_seq\_clist.)*

`\__pdfmanagement_catalog_XX_gput:n` Various commands to handle subentries and special cases.

```
305 \pdfdict_new:n { g__pdf_Core/Catalog}
306
307 \clist_const:Nn \c__pdfmanagement_Catalog_toplevel_clist
308 {
309     Collection,
310     DPartRoot,
311     Lang,
312     Legal,
313     Metadata,
314     NeedsRendering,
315     OCProperties/D,
316     OpenAction,
317     PageLabels,
318     PageLayout,
319     PageMode,
320     Perms,
321     PieceInfo,
322     SpiderInfo,
323     StructTreeRoot,
324     Threads,
325     URI,
326     Version
327 }
328
329 \clist_const:Nn \c__pdfmanagement_Catalog_sub_clist
330 {
331     AA,
332     AcroForm,
333     AcroForm/DR,
334     AcroForm/DR/Font,
335     MarkInfo,
336     ViewerPreferences,
337     OCProperties
338 }
339
340 \clist_map_inline:Nn \c__pdfmanagement_Catalog_sub_clist
341 {
342     \pdfdict_new:n { g__pdf_Core/Catalog/#1}
343 }
344
345
346 \clist_const:Nn \c__pdfmanagement_Catalog_seq_clist
347 {
```

```

348     AF,
349     OCProperties/OCGs,
350     OCProperties/Configs,
351     OutputIntents,
352     Requirements,
353     AcroForm/Fields,
354     AcroForm/CO
355 }
356
357
358
359 \clist_map_inline:Nn \c__pdfmanagement_Catalog_seq_clist
360 {
361     \seq_new:c { g__pdfmanagement_/Catalog/#1_seq } % new name later
362     \cs_new_protected:cpn { __pdfmanagement_handler/Catalog/#1_gput:n } ##1
363     {
364         \seq_gput_right:cn { g__pdfmanagement_/Catalog/#1_seq } { ##1 }
365     }
366 }
367
368 \cs_new_protected:cpn { __pdfmanagement_handler/Catalog/OCProperties/D_gput:n } #1
369 {
370     \seq_gput_left:cn
371     { g__pdfmanagement_/Catalog/OCProperties/Configs_seq }
372     { #1 }
373 }

```

(End definition for \\_\_pdfmanagement\_catalog\_XX\_gput:n.)

## Building the catalog: Push order

\\_\_pdfmanagement\_Catalog\_gpush:

```

374 \cs_new_protected:Npn \__pdfmanagement_Catalog_gpush:
375 {
376     \use:c { __pdfmanagement_/Catalog/AA_gpush: }
377     \use:c { __pdfmanagement_/Catalog/AcroForm_gpush: }
378     \use:c { __pdfmanagement_/Catalog/AF_gpush: }
379     \use:c { __pdfmanagement_/Catalog/MarkInfo_gpush: }
380     \use:c { __pdfmanagement_/Catalog/OCProperties_gpush: }
381     \use:c { __pdfmanagement_/Catalog/OutputIntents_gpush: }
382     \use:c { __pdfmanagement_/Catalog/Requirements_gpush: }
383     \use:c { __pdfmanagement_/Catalog/ViewerPreferences_gpush: }
384     % output the single values:
385     \prop_map_function:cN { \pdfdict_name:n { g__pdf_Core/Catalog } } \__pdf_backend_catalog_
386     % output names tree:
387     \use:c { __pdfmanagement_/Catalog/Names/EmbeddedFiles_gpush: }
388 }

```

(End definition for \\_\_pdfmanagement\_Catalog\_gpush:.)

## Building catalog entries: AA

\\_\_pdfmanagement\_/Catalog/AA\_gpush:

```

389 \cs_new_protected:cpn { __pdfmanagement_/Catalog/AA_gpush: }

```



```

390 {
391   \prop_if_empty:cF
392   { \pdfdict_name:n { g__pdf_Core/Catalog/AA } }
393   {
394     \__pdf_backend_object_new:nn { g__pdfmanagement_/Catalog/AA_obj } { dict }
395     \__pdf_backend_object_write:nx
396       { g__pdfmanagement_/Catalog/AA_obj }
397       { \pdfdict_use:n { g__pdf_Core/Catalog/AA } }
398     \exp_args:Nnx
399     \__pdf_backend_catalog_gput:nn
400       {AA}
401       {
402         \__pdf_backend_object_ref:n { g__pdfmanagement_/Catalog/AA_obj }
403       }
404   }
405 }

```

(End definition for \\_\_pdfmanagement\_/Catalog/AA\_gpush:.)

**Building catalog entries: AcroForm** This is the most complicated case. The entries is build from /Catalog/AcroForm/Fields (array), /Catalog/AcroForm/CO (array), /Catalog/AcroForm/DR/Font (dict), /Catalog/AcroForm/DR (dict), /Catalog/AcroForm

\\_\_pdfmanagement\_/Catalog/AcroForm\_gpush:

```

406 \cs_new_protected:cpn { __pdfmanagement_/Catalog/AcroForm_gpush: }
407 {
408   \seq_if_empty:cF { g__pdfmanagement_/Catalog/AcroForm/Fields_seq }
409   {
410     \__pdf_backend_object_new:nn { g__pdfmanagement_/Catalog/AcroForm/Fields_obj } { array }
411     \__pdf_backend_object_write:nx
412       { g__pdfmanagement_/Catalog/AcroForm/Fields_obj }
413       { \seq_use:cn { g__pdfmanagement_/Catalog/AcroForm/Fields_seq } {-} }
414     \exp_args:Nnnx
415     \prop_gput:cnn %we have to use \prop here to avoid the handler ...
416     { \pdfdict_name:n { g__pdf_Core/Catalog/AcroForm } }
417     { Fields }
418     { \__pdf_backend_object_ref:n { g__pdfmanagement_/Catalog/AcroForm/Fields_obj } }
419   }
420   \seq_if_empty:cF { g__pdfmanagement_/Catalog/AcroForm/CO_seq }
421   {
422     \__pdf_backend_object_new:nn { g__pdfmanagement_/Catalog/AcroForm/CO_obj } { array }
423     \exp_args:Nnx
424     \__pdf_backend_object_write:nn
425       { g__pdfmanagement_/Catalog/AcroForm/CO_obj }
426       { \seq_use:cn { g__pdfmanagement_/Catalog/AcroForm/CO_seq } {-} }
427     \exp_args:Nnnx
428     \prop_gput:cnn %we have to use \prop here to avoid the handler ...
429     { \pdfdict_name:n { g__pdf_Core/Catalog/AcroForm } }
430     { CO }
431     { \__pdf_backend_object_ref:n { g__pdfmanagement_/Catalog/AcroForm/CO_obj } }
432   }
433   \prop_if_empty:cF { \pdfdict_name:n { g__pdf_Core/Catalog/AcroForm/DR/Font}}
434   {
435     \__pdf_backend_object_new:nn { g__pdfmanagement_/Catalog/AcroForm/DR/Font_obj } { dict }

```

```

436     \exp_args:Nnx
437     \__pdf_backend_object_write:nn
438     { g__pdfmanagement_/Catalog/AcroForm/DR/Font_obj }
439     { \pdfdict_use:n { g__pdf_Core/Catalog/AcroForm/DR/Font } }
440     \exp_args:Nnnx
441     \prop_gput:cnn %we have to use \prop here to avoid the handler ...
442     { \pdfdict_name:n { g__pdf_Core/Catalog/AcroForm/DR } }
443     { Font }
444     { \__pdf_backend_object_ref:n { g__pdfmanagement_/Catalog/AcroForm/DR/Font_obj } }
445 }
446 \prop_if_empty:cF { \pdfdict_name:n { g__pdf_Core/Catalog/AcroForm/DR} }
447 {
448     \__pdf_backend_object_new:nn { g__pdfmanagement_/Catalog/AcroForm/DR_obj } {dict}
449     \exp_args:Nnx
450     \__pdf_backend_object_write:nn
451     { g__pdfmanagement_/Catalog/AcroForm/DR_obj }
452     { \pdfdict_use:n { g__pdf_Core/Catalog/AcroForm/DR } }
453     \exp_args:Nnnx
454     \prop_gput:cnn %we have to use \prop here to avoid the handler ...
455     { \pdfdict_name:n { g__pdf_Core/Catalog/AcroForm } }
456     { DR }
457     { \__pdf_backend_object_ref:n { g__pdfmanagement_/Catalog/AcroForm/DR_obj } }
458 }
459 \prop_if_empty:cF { \pdfdict_name:n { g__pdf_Core/Catalog/AcroForm} }
460 {
461     \__pdf_backend_object_new:nn { g__pdfmanagement_/Catalog/AcroForm_obj } {dict}
462     \exp_args:Nnx
463     \__pdf_backend_object_write:nn
464     { g__pdfmanagement_/Catalog/AcroForm_obj }
465     { \pdfdict_use:n { g__pdf_Core/Catalog/AcroForm } }
466     \exp_args:Nnnx
467     \__pdfmanagement_handler_gput:nnn
468     { Catalog }
469     { AcroForm }
470     { \__pdf_backend_object_ref:n { g__pdfmanagement_/Catalog/AcroForm_obj } }
471 }
472 }
473

```

(End definition for \\_\_pdfmanagement\_/Catalog/AcroForm\_gpush:.)

**Building catalog entries: AF** AF is an array.

\\_\_pdfmanagement\_/Catalog/AF\_gpush:

```

474 \cs_new_protected:cpn { __pdfmanagement_/Catalog/AF_gpush: }
475 {
476     \seq_if_empty:cF
477     { g__pdfmanagement_/Catalog/AF_seq }
478     {
479         \__pdf_backend_object_new:nn { g__pdfmanagement_/Catalog/AF_obj } { array }
480         \exp_args:Nnx
481         \__pdf_backend_object_write:nn
482         { g__pdfmanagement_/Catalog/AF_obj }
483         { \seq_use:cn { g__pdfmanagement_/Catalog/AF_seq } {~} }

```

```

484         \exp_args:Nnx
485         \__pdf_backend_catalog_gput:nn
486         {AF}
487         {
488             \__pdf_backend_object_ref:n {g__pdfmanagement_/Catalog/AF_obj}
489         }
490     }
491 }

```

(End definition for \\_\_pdfmanagement\_/Catalog/AF\_gpush:.)

## Building catalog entries: MarkInfo

\\_\_pdfmanagement\_/Catalog/MarkInfo\_gpush:

```

492 \cs_new_protected:cpn { __pdfmanagement_/Catalog/MarkInfo_gpush: }
493 {
494     \prop_if_empty:cF
495     { \pdfdict_name:n { g__pdf_Core/Catalog/MarkInfo } }
496     {
497         \__pdf_backend_object_new:nn { g__pdfmanagement_/Catalog/MarkInfo_obj } { dict }
498         \exp_args:Nnx
499         \__pdf_backend_object_write:nn
500         { g__pdfmanagement_/Catalog/MarkInfo_obj }
501         { \pdfdict_use:n { g__pdf_Core/Catalog/MarkInfo } }
502         \exp_args:Nnx
503         \__pdf_backend_catalog_gput:nn
504         {MarkInfo}
505         {
506             \__pdf_backend_object_ref:n {g__pdfmanagement_/Catalog/MarkInfo_obj}
507         }
508     }
509 }

```

(End definition for \\_\_pdfmanagement\_/Catalog/MarkInfo\_gpush:.)

## Building catalog entries: OCProperties This is a dictionary with three entries:

**/OCGs** (required) An array of indirect references, access needed for more than one package.

**/D** (required) a dict (given as an object name) to the default configuration

**/Configs** (optional) an array of indirect references to more configurations.

The /D entry is also a config, it is the first of the seq. The overall structure is nested: a dict with arrays.

\\_\_pdfmanagement\_/Catalog/OCProperties\_gpush:

```

510 % Catalog/OCProperties: OCGs + D is required
511 \cs_new_protected:cpn { __pdfmanagement_/Catalog/OCProperties_gpush: }
512 {
513     \int_compare:nNnT
514     {
515         ( \seq_count:c { g__pdfmanagement_/Catalog/OCProperties/OCGs_seq } ) *
516         ( \seq_count:c { g__pdfmanagement_/Catalog/OCProperties/Configs_seq } )

```

```

517     }
518     >
519     { 0 }
520     {
521         \__pdf_backend_object_new:nn { g__pdfmanagement_/Catalog/OCProperties_obj } { dict }
522         \seq_gpop_left:cn { g__pdfmanagement_/Catalog/OCProperties/Configs_seq } \l_tmpa_tl
523         \exp_args:Nnx
524         \__pdf_backend_object_write:nn {g__pdfmanagement_/Catalog/OCProperties_obj}
525         {
526             /OCGs~ [ \seq_use:cn { g__pdfmanagement_/Catalog/OCProperties/OCGs_seq } {~} ]
527             /D~\l_tmpa_tl~
528             \seq_if_empty:cF { g__pdfmanagement_/Catalog/OCProperties/Configs_seq }
529             {
530                 /Configs~
531                 [ \seq_use:cn { g__pdfmanagement_/Catalog/OCProperties/Configs_seq } {~} ]
532             }
533         }
534         \exp_args:Nnx
535         \__pdf_backend_catalog_gput:nn
536         { OCProperties }
537         { \__pdf_backend_object_ref:n {g__pdfmanagement_/Catalog/OCProperties_obj} }
538     }
539 }

```

(End definition for \\_\_pdfmanagement\_/Catalog/OCProperties\_gpush:.)

**Building catalog entries: OutputIntents** OutputIntents is an array.

\\_\_pdfmanagement\_/Catalog/OutputIntents\_gpush:

```

540 \cs_new_protected:cpn { __pdfmanagement_/Catalog/OutputIntents_gpush: }
541 {
542     \seq_if_empty:cF
543     { g__pdfmanagement_/Catalog/OutputIntents_seq }
544     {
545         \__pdf_backend_object_new:nn { g__pdfmanagement_/Catalog/OutputIntents_obj } { array }
546         \exp_args:Nnx
547         \__pdf_backend_object_write:nn
548         { g__pdfmanagement_/Catalog/OutputIntents_obj }
549         { \seq_use:cn { g__pdfmanagement_/Catalog/OutputIntents_seq } {~} }
550         \exp_args:Nnx
551         \__pdf_backend_catalog_gput:nn
552         {OutputIntents}
553         {
554             \__pdf_backend_object_ref:n {g__pdfmanagement_/Catalog/OutputIntents_obj}
555         }
556     }
557 }

```

(End definition for \\_\_pdfmanagement\_/Catalog/OutputIntents\_gpush:.)

**Building catalog entries: Requirements** Requirements is an array.

\\_\_pdfmanagement\_/Catalog/Requirements\_gpush:

```

558 \cs_new_protected:cpn { __pdfmanagement_/Catalog/Requirements_gpush: }

```

```

559 {
560   \seq_if_empty:cF
561   { g__pdfmanagement_/Catalog/Requirements_seq }
562   {
563     \__pdf_backend_object_new:nn { g__pdfmanagement_/Catalog/Requirements_obj } { array }
564     \exp_args:Nnx
565     \__pdf_backend_object_write:nn
566     { g__pdfmanagement_/Catalog/Requirements_obj }
567     { \seq_use:cn { g__pdfmanagement_/Catalog/Requirements_seq } {~} }
568     \exp_args:Nnx
569     \__pdf_backend_catalog_gput:nn
570     {Requirements}
571     {
572       \__pdf_backend_object_ref:n { g__pdfmanagement_/Catalog/Requirements_obj }
573     }
574   }
575 }

```

(End definition for \\_\_pdfmanagement\_/Catalog/Requirements\_gpush:.)

## Building catalog entries: ViewerPreferences

anagement\_/Catalog/ViewerPreferences\_gpush:

```

576 \cs_new_protected:cpn { __pdfmanagement_/Catalog/ViewerPreferences_gpush: }
577 {
578   \prop_if_empty:cF
579   { \pdfdict_name:n { g__pdf_Core/Catalog/ViewerPreferences } }
580   {
581     \__pdf_backend_object_new:nn { g__pdfmanagement_/Catalog/ViewerPreferences_obj } { di
582     \exp_args:Nnx
583     \__pdf_backend_object_write:nn
584     { g__pdfmanagement_/Catalog/ViewerPreferences_obj }
585     { \pdfdict_use:n { g__pdf_Core/Catalog/ViewerPreferences } }
586     \exp_args:Nnx
587     \__pdf_backend_catalog_gput:nn
588     {ViewerPreferences}
589     {
590       \__pdf_backend_object_ref:n {g__pdfmanagement_/Catalog/ViewerPreferences_obj}
591     }
592   }
593 }

```

(End definition for \\_\_pdfmanagement\_/Catalog/ViewerPreferences\_gpush:.)

## Building catalog entries: Names/EmbeddedFiles

**Handler** EmbeddedFiles is an array and needs a special handler to add values.

```

594 \pdfdict_new:n { g__pdf_Core/Catalog/Names }
595
596 \cs_new_protected:cpn { __pdfmanagement_handler/Catalog/Names/EmbeddedFiles_gput:n } #1
597 {
598   \__pdf_backend_NamesEmbeddedFiles_add:n { #1 }
599 }

```

(End definition for Handler. This function is documented on page ??.)

The entry should only be added if there are actually embedded files. This can be tested by checking the names\_seq

agement\_/Catalog/Names/EmbeddedFiles\_gpush:

```

600 %
601 \cs_new_protected:cpn { __pdfmanagement_/Catalog/Names/EmbeddedFiles_gpush: }
602 {
603   \seq_if_empty:NF \g__pdf_backend_EmbeddedFiles_seq
604   {
605     \exp_args:Nx \__pdf_backend_NamesEmbeddedFiles_gpush:n
606     {
607       \seq_use:Nn \g__pdf_backend_EmbeddedFiles_seq {~}
608     }
609   }
610 }

```

(End definition for \\_\_pdfmanagement\_/Catalog/Names/EmbeddedFiles\_gpush:.)

\_\_pdfmanagement\_handler/Catalog/?\_show:

A handler to show the catalog.

```

611 \cs_new_protected:cpn { __pdfmanagement_handler/Catalog/?_show: }
612 {
613   \iow_term:x
614   {
615     \iow_newline:
616     The~Catalog~contains~in~the~top~level~the~single~value~entries
617     \prop_map_function:cN { \pdfdict_name:n { g__pdf_Core/Catalog }} \msg_show_item:nn
618   }
619   \clist_map_inline:Nn \c__pdfmanagement_Catalog_seq_clist
620   {
621     \seq_if_empty:cF { g__pdfmanagement_/Catalog/##1_seq }
622     {
623       \iow_term:x
624       {
625         The~'##1'~array~contains~the~entries
626         \seq_map_function:cN { g__pdfmanagement_/Catalog/AF_seq } \msg_show_item:n
627       }
628     }
629   }
630   \clist_map_inline:Nn \c__pdfmanagement_Catalog_sub_clist
631   {
632     \prop_if_empty:cF { \pdfdict_name:n { g__pdf_Core/Catalog/##1 } }
633     {
634       \iow_term:x
635       {
636         The~Catalog~subdirectory~'##1'~contains~the~single~value~entries
637         \prop_map_function:cN { \pdfdict_name:n { g__pdf_Core/Catalog/##1 }} \msg_show_item:n
638       }
639     }
640   }
641   \tl_show:x { \tl_to_str:n { \pdfmanagement_show:n { Catalog } } }
642 }

```

(End definition for \_\_pdfmanagement\_handler/Catalog/?\_show:.)

## 2.7 xform / Properties

<sup>643</sup> \pdfdict\_new:n { g\_\_pdf\_Core/Xform/Resources/Properties}

<sup>644</sup> </package>

# Index

The italic numbers denote the pages where the corresponding entry is described, numbers underlined point to the definition, all others indicate the places where it is used.

Symbols	
\\	22, 31
B	
bool commands:	
\bool_if:NTF	37, 73, 82, 90, 256
\bool_new:N	34
C	
\clearpage	9
clist commands:	
\clist_const:Nn	272, 307, 329, 346
\clist_map_inline:Nn	280, 340, 359, 619, 630
cs commands:	
\cs_generate_variant:Nn	67, 128
\cs_if_exist:NTF	108, 112, 142, 146, 175
\cs_new_protected:Npn	45, 99, 130, 138, 160, 173, 193, 197, 201, 211, 223, 230, 242, 247, 253, 262, 267, 286, 291, 296, 301, 362, 368, 374, 389, 406, 474, 492, 511, 540, 558, 576, 596, 601, 611
D	
\DeclareDocumentMetadata	8
E	
exp commands:	
\exp_args:Nnnx	414, 427, 440, 453, 466
\exp_args:Nnx	398, 423, 436, 449, 462, 480, 484, 498, 502, 523, 534, 546, 550, 564, 568, 582, 586
\exp_args:NV	75, 76
\exp_args:Nx	232, 605
H	
Handler	594
hook commands:	
\hook_gput_code:nnn	51, 71, 80, 88
\hook_new:n	44, 68, 69, 70
I	
int commands:	
\int_compare:nNnTF	513
iow commands:	
\iow_newline:	615
\iow_term:n	613, 623, 634
M	
msg commands:	
\msg_error:nnn	59, 122, 156, 168, 208, 218
\msg_new:nnn	6, 9, 12, 15, 18, 25, 29
\msg_none:nnn	103
\msg_show:nnnnnn	199
\msg_show_item:n	626
\msg_show_item:nn	184, 617, 637
\msg_warning:nnn	63, 264, 269
N	
\newpage	4
P	
pdf internal commands:	
\_pdf_backend_catalog_gput:nn	385, 399, 485, 503, 535, 551, 569, 587
\_pdf_backend_EmbeddedFiles\_seq	603, 607
\_pdf_backend_end_run_tl	13
\_pdf_backend_info_gput:nn	225
\_pdf_backend_NamesEmbeddedFiles\_add:n	598
\_pdf_backend_NamesEmbeddedFiles\_gpsh:n	605
\_pdf_backend_object_new:nn	394, 410, 422, 435, 448, 461, 479, 497, 521, 545, 563, 581
\_pdf_backend_object_ref:n	402, 418, 431, 444, 457, 470, 488, 506, 537, 554, 572, 590
\_pdf_backend_object_write:nn	395, 411, 424, 437, 450, 463, 481, 499, 524, 547, 565, 583

\_pdf_backend_Page_gput:nn	...	244	\_pdfmanagement_/Catalog/AcroForm_-		
\_pdf_backend_Page_gremove:n	..	249	gpush:	.....	406
\_pdf_backend_PageResources_-			\_pdfmanagement_/Catalog/AF_-		
gpush:n	.....	76	gpush:	.....	474
\_pdf_backend_PageResources_-			\_pdfmanagement_/Catalog/MarkInfo_-		
gput:nnn	.....	288, 293, 298, 303	gpush:	.....	492
\_pdf_backend_PageResources_-			\_pdfmanagement_/Catalog/Names/EmbeddedFiles_-		
obj_gpush:	.....	84	gpush:	.....	600
\_pdf_backend_Pages_primitive:n		232	\_pdfmanagement_/Catalog/OCProperties_-		
\_pdf_backend_ThisPage_gpush:n	.	75	gpush:	.....	510
\_pdf_backend_ThisPage_gput:nn		258	\_pdfmanagement_/Catalog/OutputIntents_-		
pdf/management/end commands:			gpush:	.....	540
pdf/management/end_run	.....	68	\_pdfmanagement_/Catalog/Requirements_-		
pdf/management/lastpage commands:			gpush:	.....	558
pdf/management/lastpage_shipout	.	68	\_pdfmanagement_/Catalog/ViewerPreferences_-		
pdf/management/thispage commands:			gpush:	.....	576
pdf/management/thispage_shipout	.	68	\g_pdfmanagement_active_bool	...	
\pdfcatalog	.....	1, 2	.....	34, 37, 73, 82, 90, 256	
pdfdict commands:			\_pdfmanagement_Catalog_gpush:	.	
\pdfdict_if_exist:nTF	.....		.....	94, 374, 374	
.....	49, 106, 140, 162, 203, 213		\c_pdfmanagement_Catalog_seq_-		
\pdfdict_name:n	.....	117, 133,	clist	.....	305, 346, 359, 619
.....	151, 165, 179, 184, 195, 225, 226,		\c_pdfmanagement_Catalog_sub_-		
.....	255, 385, 392, 416, 429, 433, 442,		clist	.....	305, 329, 340, 630
.....	446, 455, 459, 495, 579, 617, 632, 637		\c_pdfmanagement_Catalog_-		
\pdfdict_new:n	.....	221,	toplevel_clist	.....	305, 307
.....	228, 238, 239, 282, 305, 342, 594, 643		\_pdfmanagement_catalog_XX_-		
\pdfdict_use:n	.....		gput:n	.....	305
.....	234, 397, 439, 452, 465, 501, 585		\_pdfmanagement_get:nnN	97, 130, 215	
\pdfinfo	.....	1, 2	\_pdfmanagement_gremove:nn	97, 160	
pdfmanagement commands:			\_pdfmanagement_handler/Catalog/?_-		
pdfmanagement:Info	.....	3	show:	.....	611
pdfmanagement:Page	.....	4	\_pdfmanagement_handler_-		
pdfmanagement:Page/Resources/ColorSpace	.....	5	gput:nnn	10, 55, 97, 99, 128, 467	
pdfmanagement:Page/Resources/ExtGState	.....	5	\_pdfmanagement_handler_-		
pdfmanagement:Page/Resources/Pattern	.....	5	gremove:nn	138, 205	
pdfmanagement:Page/Resources/Shading	.....	5	\_pdfmanagement_if_active:	35, 42	
pdfmanagement:Pages	.....	3	\_pdfmanagement_if_active:TF	47	
pdfmanagement:ThisPage	.....	4	\_pdfmanagement_Info_gpush:	...	
\pdfmanagement_add:nnn	.....		.....	13, 93, 222, 223	
.....	2, 3, 3, 4, 4, 5, 45, 63, 67		\c_pdfmanagement_PageResources_-		
\pdfmanagement_get:nnN	.....	211	clist	.....	272, 280
\pdfmanagement_if_active:	.....	42	\_pdfmanagement_Pages_gpush:	...	
\pdfmanagement_if_active:TF	.....	2	.....	92, 229, 230	
\pdfmanagement_if_active:p:	.....	2	\_pdfmanagement_show:n	97, 193	
\pdfmanagement_remove:nn	3, 4, 201		\_pdfmanagement_show:Nn	173, 199	
\pdfmanagement_show:n	2, 4, 197, 641		\pdfpageattr	1, 2, 4	
pdfmanagement internal commands:			\pdfpageresources	1, 2, 5	
\_pdfmanagement_/Catalog/AA_-			\pdfpagesattr	1, 2, 3	
gpush:	.....	389	prg commands:		
			\prg_new_conditional:Npnn	35	
			\prg_return_false:	39	
			\prg_return_true:	38	
			\prg_set_eq_conditional:NNn	41	



<code>\prop</code> . . . . .	415, 428, 441, 454	<code>\seq_if_empty:NTF</code> . . . . .	
prop commands:		408, 420, 476, 528, 542, 560, 603, 621	
<code>\prop_gclear:N</code> . . . . .	226	<code>\seq_map_function:NN</code> . . . . .	626
<code>\prop_get:NnN</code> . . . . .	132	<code>\seq_new:N</code> . . . . .	361
<code>\prop_gput:Nnn</code> . . . . .		<code>\seq_use:Nn</code> . . . . .	
. . . . .	116, 255, 415, 428, 441, 454	413, 426, 483, 526, 531, 549, 567, 607	
<code>\prop_gremove:Nn</code> . . . . .	150, 164	shipout commands:	
<code>\prop_if_empty:NTF</code> . . . . .		<code>\g_shipout_readonly_int</code> . . . . .	75, 76
. . . . .	391, 433, 446, 459, 494, 578, 632	<code>\special</code> . . . . .	1
<code>\prop_if_exist:NTF</code> . . . . .	179	<b>T</b>	
<code>\prop_map_function:NN</code> . . . . .		tl commands:	
. . . . .	184, 225, 385, 617, 637	<code>\tl_if_empty:nTF</code> . . . . .	21, 101
<code>\prop_show:N</code> . . . . .	195	<code>\tl_show:n</code> . . . . .	641
<code>\ProvidesExplPackage</code> . . . . .	4	<code>\tl_to_str:n</code> . . . . .	63, 183, 641
<b>S</b>		<code>\l_tmpa_tl</code> . . . . .	522, 527
seq commands:		<b>U</b>	
<code>\seq_count:N</code> . . . . .	515, 516	use commands:	
<code>\seq_gpop_left:NN</code> . . . . .	522	<code>\use:N</code> . . . . .	110, 114, 144, 148, 177, 376,
<code>\seq_gput_left:Nn</code> . . . . .	370	377, 378, 379, 380, 381, 382, 383, 387	
<code>\seq_gput_right:Nn</code> . . . . .	364		