A Complete Example (\rightarrow B.1)

Every element shows up

Version 1.6.6

July 2022

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If the subtitle is not sufficient, this <TitleComment> element can be used for a slightly longer text on the front page.

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Abstract

This document tries to use all elements that exist in GAPDoc. In addition, the final output not only contains the usual content, but also an appendix with the source text. There are also links from the usual content to the corresponding source text. This should enable new users to learn GAPDoc quickly.

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Acknowledgements

We thank Lehrstuhl für Algebra und Zahlentheorie (former Lehrstuhl D für Mathematik).

Colophon

This is the Colophon page.

Contents

1	Sectioning Elements						
	1.1	Normal subsections	5				
	1.2	ManSections	5				
2	Other Markup						
	2.1	Various types of text	8				
	2.2	Formulae	9				
	2.3	Crossreferencing	10				
	2.4	Lists and Tables	10				
	2.5	Entities and Special Characters	11				
A	An A	Appendix	12				
В	The	Source	13				
	B .1	TitlePage (Source)	13				
	B.2	Before First Chapter (Source)	14				
	B.3	First Chapter (Source)	14				
	B.4	ManSections (Source)	14				
	B.5	Various Types of Text (Source)	16				
	B.6	Verbatim-like text (Source)	17				
	B.7	Formulae (Source)	18				
	B.8	Crossreferencing (Source)	19				
	B.9	Lists and Tables (Source)	20				
	B.10	Entities and Special Characters (Source)	22				
		Appendix (Source)	23				
Re	References						
In	Index						

Text before chapter 1. $(\rightarrow B.2)$

Chapter 1

Sectioning Elements

Text before the section 1.1. $(\rightarrow B.2)$

1.1 Normal subsections

 $[\rightarrow B.3]$

1.1.1 A subsection

This is text in the first subsection.

1.1.2 Another subsection

This is text in the second subsection. This subsection has a label, such that one can reference it.

1.2 ManSections

 $[\rightarrow B.4]$

1.2.1 f

 $\triangleright f(x[, y])$ (function)

Returns: an element in IsBlubb (1.2.8) or fail.

This function calculates something.

This method is for an operation with a tricky name.

1.2.3 MyOperation

 \triangleright MyOperation(x) (operation)

The operation MyOperation operates on x.

1.2.4 MyOperation (First)

This method calculates something by the generic method.

1.2.5 MyOperation (for bla)

This is the super-fast method for the operation MyOperation (1.2.3) if the argument x is in the representation IsBla (1.2.7). It will become even faster if the optional argument $good_hint$ is given.

1.2.6 MyConstructor

▷ MyConstructor(filt, x) (constructor)

The constructor MyConstructor constructs from x an object in filt.

1.2.7 IsBla

$$\triangleright$$
 IsBla(obj) (representation)

For objects in this representation there is a super-fast method (see MyOperation (1.2.5)) for the operation (1.2.3).

1.2.8 IsBlubb

 \triangleright IsBlubb(obj) (property)

A property.

1.2.9 NumberBlobbs

 \triangleright NumberBlobbs(obj) (attribute)

An attribute. Number of blobbs.

1.2.10 AllBlibbs

▷ AllBlibbs (global variable)

This global variable holds a list of all blibbs.

1.2.11 BlibbsFamily

▷ BlibbsFamily (family)

Family of all blibbs.

1.2.12 InfoBlibbs

This info class is used throughout the library of blibbs.

Chapter 2

Other Markup

2.1 Various types of text

```
[\rightarrow B.5]
```

In this section we present examples for all the various types of text that are possible in GAPDoc:

- This is emphasized.
- *Keywords* are typeset like this and that.
- Arguments of functions have an element. They look like this: x and y.
- Code can be written with the Code element: if x = y then Print("Equal"); fi; or while true do Print("Hello"); od;.
- Filenames have their own element: /usr/local/ca/gap4r2 or pkg/xgap/doc.
- Buttons, menus, menu entries, and such things are also supported: OK or CANCEL.
- Packages are typeset like this: Small Groups Library
- Quoted text: "This is a text in quotes."

Paragraphs are separated by the empty Par or P element.

Alternatives for different output formats: This is LATEX output.

There are also three elements to typeset "verbatim-like" text. $(\rightarrow B.6)$

The first is a *Listing*:

```
od;
return Compacted(1);
end;
```

Here is a *Log* of a GAP session using this function:

Here is a GAP *Example* session that is automatically tested:

```
Example

gap> s := Size(CharacterTable("M"));
808017424794512875886459904961710757005754368000000000

gap> s < 10^53;
false
gap> s < 10^54;
true
```

2.2 Formulae

 $[\rightarrow B.7]$

There are three types of formulae.

The first is the *normal math mode* of LATEX: $b_i \cdot b_j = \sum_{k=1}^d h_{ijk} b_k$. Then there are *displayed formulae*:

$$\implies \left(\sum_{i=1}^{d} x_i b_i\right) \cdot \left(\sum_{j=1}^{d} y_j b_j\right) = \sum_{k=1}^{d} \left(\sum_{i,j} x_i y_j h_{ijk}\right) b_k$$

If possible, use the Alt element to specify a better readable text version of such a formula as in the following example:

$$\implies \left(\sum_{i=1}^{d} x_i b_i\right) \cdot \left(\sum_{j=1}^{d} y_j b_j\right) = \sum_{k=1}^{d} \left(\sum_{i,j} x_i y_j h_{ijk}\right) b_k$$

For small formulae without "difficult" parts use the M element: b_i , x^2 , $x^2 + 2x + 1 = (x+1)^2$. Note that here whitespace matters for text (or HTML) output.

Here are two formulae containing less than characters which are special characters for XML: a < b < c < d and e < f.

Using the Mode attribute of a Display element formulae like

$$a \longrightarrow a \mod m'$$

can also be displayed nicely in text and HTML output.

2.3 Crossreferencing

```
[\rightarrow B.8]
```

In this section we demonstrate various references to parts of this document. Here is a reference to this section: 2.3. Here is a reference to chapter 1, to appendix A, and to subsection 1.1.1.

We distinguish among others references to functions (see f (1.2.1)), to methods with tricky name (see $^{\{\}}[] \$ (1.2.2)), to operation (see MyOperation (1.2.3)), to methods (see MyOperation (1.2.4) or MyOperation (1.2.5)), to filters (see IsBla (1.2.7)), to properties (see IsBlubb (1.2.8)), to attributes (see NumberBlobbs (1.2.9)), to variables (AllBlibbs (1.2.10)), to families (see BlibbsFamily (1.2.11)), and to info classes (see InfoBlibbs (1.2.12)).

There are also references to labels: see 2.3, to other books: see (GAPDoc: What is a DTD?) or IsSubgroup (Reference: IsSubgroup) in the GAP reference manual.

References to sections come in two styles: 1 or 'Sectioning Elements'.

Another type of cross referencing is bibliography. Here is a citation: [CR81, (5.22)] is an interesting lemma.

There are also URLs:

```
http://www.math.rwth-aachen.de/
Email addresses have a special element: Frank.Luebeck@Math.RWTH-Aachen.De
and Homepages another one: http://www-groups.mcs.st-and.ac.uk/~neunhoef/
```

One can generate index entries as follows (look up the words "TeX-UserGroup", "RWTH", "Aachen, Hauptbahnhof", and "GAPDoc, for GAP programmers").

2.4 Lists and Tables

And here is a link to the EDIM archives.

 $[\rightarrow B.9]$

There are

- lists
- enumerations, and
- · tables

or:

- 1. lists
- 2. enumerations, and
- 3. tables

or with marks:

lists: not numbered

enumerations:

numbered

tables:

two-dimensional

Lists can also be nested:

- 1. (a) first item of inner enumeration
 - (b) second item of inner enumeration
- 2. first item of inner list
 - second item of inner list

Here is a *table*:

Object	Price	available
Shoe	\$1,00	there
Hat	\$2,00	not there

Table: Prices

2.5 Entities and Special Characters

 $[\rightarrow B.10]$

Here is a table of special characters, the first two are special for XML and must be typed in by entities in GAPDoc documents. The other characters are special for LATEX but in GAPDoc they can be typed directly.



Table: Special characters in character data

And here are the predefined entities in GAPDoc:

⪆	GAP
&GAPDoc	GAPDoc
&TeX	TEX
&LaTeX	IAT _E X
&BibTeX	BibT _E X
&MeatAxe	MeatAxe
&XGAP	XGAP
©right	©

Table: Predefined Entities in the GAPDoc system

And some more for mathematical symbols: \mathbb{C} , \mathbb{Z} , \mathbb{N} , \mathbb{P} , \mathbb{Q} , \mathbb{H} , \mathbb{R} .

Appendix A

An Appendix

 $[\rightarrow B.11] \\ This is an appendix.$

Appendix B

The Source

B.1 TitlePage (Source)

```
<TitlePage>
  <Title>A Complete Example (&see; <Ref Sect="One"/>)</Title>
  <Subtitle>Every element shows up</Subtitle>
  <Version>Version 1.6.6
</Version>
  <TitleComment>
  If the subtitle ist not sufficient, this < TitleComment>
  element can be used for a slightly longer text on the front page.
  </TitleComment>
  <Author>Frank Lübeck
          <Email>Frank.Luebeck@Math.RWTH-Aachen.De</Email>
  </Author>
  <Author> Max Neunhöffer
          <Email>neunhoef at mcs.st-and.ac.uk</Email>
  </Author>
  <Date>January 2022</pate>
  Lehrstuhl für Algebra und Zahlentheorie <Br/>Pontdriesch
  14/16 < Br/> 52062 Aachen < Br/> (Germany)
  </Address>
  <Abstract>This document tries to use all elements that exist in &GAPDoc;.
            In addition, the final output not only contains the usual
            content, but also an appendix with the source text. There
            are also links from the usual content to the corresponding
            source text. This should enable new users to learn &GAPDoc;
            quickly.
  </Abstract>
  <Copyright>&copyright; 2000-2022 by Frank Lübeck and Max Neunhöffer
  </Copyright>
  <Acknowledgements>We thank Lehrstuhl für Algebra und Zahlentheorie
  (former Lehrstuhl D für Mathematik).
  </Acknowledgements>
  <Colophon>This is the Colophon page.
  </Colophon>
```

```
</TitlePage>
```

B.2 Before First Chapter (Source)

```
<TableOfContents/>
<Body>

Text before chapter <Ref Chap="First"/>.

<Chapter Label="First"><Heading>Sectioning Elements</Heading>

Text before the section <Ref Sect="FirstSect"/>.
```

B.3 First Chapter (Source)

[1]

B.4 ManSections (Source)

[1.2]

```
<ManSection>
<Meth Name="\^\{\}\[\]\&lt;\&amp;" Arg="c"
       Label="for nothing" Comm="tricky name"/>
<Description>
 This method is for an operation with a tricky name.
 </Description>
</ManSection>
<ManSection>
 <Oper Name="MyOperation" Arg="x" Comm="calculates something"/>
<Description>
 The operation <Ref Oper="MyOperation"/> operates on <Arg>x</Arg>.
 </Description>
</ManSection>
<ManSection>
<Meth Name="MyOperation" Label="First" Arg="x"</pre>
       Comm="generic method"/>
<Description>
 This method calculates something by the generic method.
 </Description>
</ManSection>
<ManSection>
 <Meth Name="MyOperation" Label="for bla" Arg="x[, good_hint]"</pre>
      Comm="for bla arguments"/>
<Description>
 This is the super-fast method for the operation
 <Ref Oper="MyOperation"/> if the argument <A>x</A> is in the
 representation <Ref Filt="IsBla"/>. It will become even faster if
 the optional argument <A>good_hint</A> is given.
 </Description>
</ManSection>
<ManSection>
 <Constr Name="MyConstructor" Arg="filt, x" Comm="constructs something"/>
 The constructor <Ref Oper="MyConstructor"/> constructs from <Arg>x</Arg>
 an object in <A>filt</A>.
 </Description>
</ManSection>
<ManSection>
 <Filt Name="IsBla" Arg="obj" Comm="representation bla"</pre>
      Type="representation"/>
<Description>
 For objects in this representation there is a super-fast method
 (see <Ref Meth="MyOperation" Label="for bla"/>) for the operation
 <Ref Oper="MyOperation"/>.
 </Description>
</ManSection>
```

```
<ManSection>
 <Prop Name="IsBlubb" Arg="obj" Comm="property, whether object is blubb"/>
 <Description>
  A property.
 </Description>
 </ManSection>
 <ManSection>
 <a href="NumberBlobbs" Arg="obj" Comm="number of blobbs"/>
  An attribute. Number of blobbs.
 </Description>
 </ManSection>
 <ManSection>
 <Var Name="AllBlibbs" Comm="list of all blibbs in the system"/>
 <Description>
  This global variable holds a list of all blibbs.
 </Description>
 </ManSection>
 <ManSection>
 <Fam Name="BlibbsFamily" Comm="family of blibbs"/>
 <Description>
  Family of all blibbs.
 </Description>
 </ManSection>
 <ManSection>
 <InfoClass Name="InfoBlibbs" Comm="InfoClass for the library of blibbs"/>
 <Description>
  This info class is used throughout the library of blibbs.
  </Description>
 </ManSection>
</Section>
```

B.5 Various Types of Text (Source)

[2]

```
<E>Keywords</E> are typeset like <Keyword>this</Keyword> and <K>that</K>.
  </Item>
 <Item>
  <E>Arguments</E> of functions have an element. They look like this:
    <Arg>x</Arg> and <A>y</A>.</Item>
 <Ttem>
  <E>Code</E> can be written with the Code element:
    <Code>if x = y then Print("Equal"); fi;</Code> or
    <C>while true do Print("Hello"); od;</C>.</Item>
 <Item>
  <E>Filenames</E> have their own element:
    <File>/usr/local/ca/gap4r2</File> or <F>pkg/xgap/doc</F>.</Item>
  <E>Buttons</E>, <E>menus</E>, <E>menu entries</E>, and such things
    are also supported: <B>OK</B> or <Button>Cancel</Button>.</Item>
  <E>Packages</E> are typeset like this:
    <Package>Small Groups Library</Package>
 </Item>
 <Item>
  <E>Quoted</E> text: <Q>This is a text in quotes.</Q>
</List>
<E>Paragraphs</E> are separated by the empty <C>Par</C> or <C>P</C> element.
<Par/><E>Alternatives</E> for different output formats:
<Alt Only="LaTeX">This is &LaTeX; output.</Alt>
<Alt Not="LaTeX">This is other than &LaTeX; output, namely:
<Alt Only="HTML"><![CDATA[<b>HTML</b>]]></Alt>
<Alt Only="Text">Text</Alt> output.</Alt>
<P/>
```

B.6 Verbatim-like text (Source)

[2.1]

```
There are also three elements to typeset <Q>verbatim-like</Q> text.
<P/>
The first is a <E>Listing</E>:

<Listing Type="GAP code">
<![CDATA[Sieve := function(n)

# Returns the primes less than n
local 1,p,i;

1 := [1..n]; Unbind(1[1]);

p := 2;

while p^2 <= n do

if IsBound(1[p]) then
```

```
i := 2 * p;
          while i \le n do Unbind(l[i]); i := i + p; od;
      fi;
      p := p + 1;
  od;
  return Compacted(1);
end;]]>
</Listing>
Here is a \langle E \rangle Log \langle /E \rangle of a ⪆ session using this function:
<Log>
gap> Sieve(100);
[ 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61,
  67, 71, 73, 79, 83, 89, 97]
gap> Length(last);
25
</Log>
Here is a ⪆ <E>Example</E> session that is automatically tested:
<Example>
gap> s := Size(CharacterTable("M"));
808017424794512875886459904961710757005754368000000000\\
gap> s < 10^53;
false
gap> s < 10^54;
true
</Example>
</Section>
```

B.7 Formulae (Source)

[2.2]

```
<Section><Heading>Formulae</Heading>

There are three types of formulae. <P/>
The first is the <E>normal math mode</E> of &LaTeX;:

<Math>b_i \cdot b_j = \sum_{k=1}^d h_{ijk} b_k</Math>.

Then there are <E>displayed formulae</E>:

<Display>
   \Longrightarrow \quad \left(\sum_{i=1}^d x_i b_i \right) \cdot \left(\sum_{j=1}^d y_j b_j \right) = \sum_{k=1}^d \left(\sum_{i,j} x_i y_j h_{ijk} \right) b_k </Display>

If possible, use the <C>Alt</C> element to specify a better readable text
```

```
version of such a formula as in the following example: <P/>
<Alt Not="Text, HTML"><Display>
  \Longrightarrow \quad \left(\sum_{i=1}^d x_i b_i \right) \cdot
  \left(\sum_{j=1}^d y_j b_j \right) =
   </Display></Alt>
<Alt Only="Text, HTML"><Verb>
        d
                       ) y_i b_i ) = ) (
      i = 1
                      i = 1
                                       k = 1
</Verb><P/></Alt>
For small formulae without Q> difficult</Q> parts use the <C>M</C>
element: <M>b_i</M>,
<M>x^2</M>, <M>x^2 + 2x + 1 = (x + 1)^2</M>. Note that here whitespace
matters for text (or HTML) output).<P/>
Here are two formulae containing less than characters which are special
characters for XML:
M < ! [CDATA[a < b < c < d]] > < M > and <math>M > e  & lt; f < M > .
</Section>
```

B.8 Crossreferencing (Source)

[2.3]

```
<Section Label="Cross"><Heading>Crossreferencing</Heading>
<Label Name="there"/>
In this section we demonstrate various references to parts of this
document. Here is a reference to this section: <Ref Sect="Cross"/>.
Here is a reference to chapter <Ref Chap="First"/>, to appendix
<Ref Appendix="Appendix"/>, and to subsection <Ref Subsect="Asub"/>.
We distinguish among others references
 to functions (see <Ref Func="f"/>),
 to methods with tricky name (see
                 <Ref Meth="\^\{\}\[\]\&lt;\&amp;" Label="for nothing"/>),
 to operations (see <Ref Oper="MyOperation"/>),
 to methods (see <Ref Meth="MyOperation" Label="First"/> or
                 <Ref Meth="MyOperation" Label="for bla"/>),
 to filters (see <Ref Filt="IsBla"/>),
 to properties (see <Ref Prop="IsBlubb"/>),
 to attributes (see <Ref Attr="NumberBlobbs"/>),
```

```
to variables (<Ref Var="AllBlibbs"/>),
 to families (see <Ref Fam="BlibbsFamily"/>),
 and to info classes (see <Ref InfoClass="InfoBlibbs"/>).
There are also references to labels: see <Ref Text="here" Label="there"/>,
to other books: see <Ref Sect="syntaxXML" BookName="gapdoc"/> or
<Ref Oper="IsSubgroup" BookName="ref"/> in the &GAP; reference
manual.
<P/>
References to sections come in two styles:
<Ref Chap="First" Style="Number"/>
or <Ref Chap="First" Style="Text"/>.
<P/>
Another type of cross referencing is bibliography. Here is a
citation: <Cite Key="CR1" Where="(5.22)"/> is an interesting lemma.
There are also URLs:<P/>
<URL>http://www.math.rwth-aachen.de/LDfM/</URL><P/>
Email addresses have a special element:
<Email>Frank.Luebeck@Math.RWTH-Aachen.De</Email>
<P/>
and Homepages another one:
<Homepage>http://www-groups.mcs.st-and.ac.uk/~neunhoef/</Homepage>
<P/>
One can generate index entries as follows (look up the words
Q\&TeX;-UserGroup</Q>, Q\RWTH</Q>, and Q\Aachen, Hauptbahnhof</Q>).
<Index Key="TeX-Usergroup">&TeX;-UserGroup</Index>
<Index>RWTH</Index>
<Index>Aachen <Subkey>Hauptbahnhof</Subkey></Index>
<Index Key="GAPDoc" Subkey="for GAP programmers">&GAPDoc;
<Subkey>for &GAP; programmers</Subkey></Index>
</Section>
```

B.9 Lists and Tables (Source)

[2.4]

```
<Section><Heading>Lists and Tables</Heading>
There are
<List>
  <Item>lists</Item>
```

```
<Item>enumerations, and</Item>
 <Item>tables</Item>
</List>
or:
<Enum>
 <Item>lists</Item>
 <Item>enumerations, and</Item>
 <Item>tables</Item>
</Enum>
or with marks:
<List>
 <Mark>lists:</Mark><Item> not numbered</Item>
 <Mark>enumerations:</Mark><Item> numbered</Item>
 <Mark>tables:</Mark><Item> two-dimensional</Item>
</List>
Lists can also be nested:
<Enum>
 <Item>
   <Enum>
     <Item>first item of inner enumeration </Item>
     <Item>second item of inner enumeration </Item>
   </Enum>
 </Item>
 <Item>
   <List>
     <Item>first item of inner list </Item>
     <Item>second item of inner list </Item>
   </List>
  </Item>
</Enum>
Here is a <E>table</E>:
<Table Align="|r|c|1|">
 <Caption>Prices</Caption>
 <HorLine/>
  <Row>
   <Item>Object</Item><Item>Price</Item><Item>available</Item>
  </Row>
 <HorLine/>
 <HorLine/>
  <Row>
   <Item>Shoe</Item><Item>$1,00</Item><Item>there</Item>
  </Row>
 <HorLine/>
  <Row>
   <Item>Hat</Item><Item>$2,00</Item><Item>not there</Item>
  </Row>
 <HorLine/>
</Table>
```

</Section>

B.10 Entities and Special Characters (Source)

[2.5]

```
<Section><Heading>Entities and Special Characters</Heading>
<Label Name="TenBack"/>
[&see; <Ref Sect="Ten"/>]<P/>
Here is a table of special characters, the first two are special for
XML and must be typed in by entities in &GAPDoc; documents. The other
characters are special for &LaTeX; but in &GAPDoc; they can be typed
directly.
<Table Align="|c|c|c|c|c|c|c|c|c|c|c|c|c| Label="charsInCDATA">
 <Caption>Special characters in character data</Caption>
 <HorLine/> <Row>
  <Item><C>&amp;</C></Item>
  <Item><C>&lt;</C></Item>
  <Item><C>></C></Item>
  <Item><C>#</C></Item>
  < Item > < C > $ < /C > < / Item >
  <Item><C>%</C></Item>
  <Item><C>~</C></Item>
  <Item><C>\\</C></Item>
  <Item><C>{</C></Item>
  <Item><C>}</C></Item>
  <Item><C>_</C></Item>
  <Item><C>^</C></Item>
  <Item><C>&nbsp;</C></Item>
 </Row> <HorLine/>
</Table>
And here are the predefined entities in &GAPDoc;:
<Table Align="|1|1|">
<Caption>Predefined Entities in the &GAPDoc; system</Caption>
<HorLine/>
<Row> <Item><C>&amp;GAP;</C></Item>
                                          <Item>&GAP;</Item> </Row>
<HorLine/>
<Row> <Item><C>&amp;GAPDoc;</C></Item>
                                          <Item>&GAPDoc;</Item> </Row>
<HorLine/>
<Row> <Item><C>&amp; TeX; </C></Item>
                                           <Item>&TeX;</Item> </Row>
<HorLine/>
<Row> <Item><C>&amp;LaTeX;</C></Item>
                                           <Item>&LaTeX;</Item> </Row>
<HorLine/>
<Row> <Item><C>&amp;BibTeX;</C></Item>
                                           <Item>&BibTeX;</Item> </Row>
<HorLine/>
<Row> <Item><C>&amp;MeatAxe;</C></Item>
                                           <Item>&MeatAxe;</Item> </Row>
```

B.11 Appendix (Source)

[A]

```
GAPDoc source

<Appendix><Heading>An Appendix</Heading>

This is an appendix.
</Appendix>
```

References

[CR81] C. W. Curtis and I. Reiner. *Methods of Representation Theory*, volume I. John Wiley & Sons, New York, Chichester, Brisbane, Toronto, Singapore, 1981. 10

Index

```
\^\{\}\[\]\<\&
    for nothing, 5
Aachen
    Hauptbahnhof, 10
{\tt AllBlibbs}, {\color{red} 6}
BlibbsFamily, 7
f, 5
GAPDoc
    for GAP programmers, 10
InfoBlibbs, 7
IsBla, 6
IsBlubb, 6
MyConstructor, 6
MyOperation, 6
    First, 6
    for bla, 6
{\tt NumberBlobbs}, {\tt 6}
RWTH, 10
T<sub>E</sub>X-UserGroup, 10
```