Valid But Readable: Writing *D2d* For Constructing XML

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1. Goals and Principles of d2d
2. Input and Parsing
3. Modules and Parametrization
4. Error Recovery and Diagnosis
5. Documentation and Subsequent Processing
6. Comprehension
7. Prototypical Applications

1 Goals and Principles of d2d

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#d2d

(= directly to document
or Direct Document Denotation
or "triple-dee")

<> **Goals:**

- <> let domain experts easily write down XML encoded texts
- <> do it "in the flow" of writing:
  no clicking, no menus, no light show
- <> use any editor you like, use pen and pencil, use voice input
- <> readable not only by computers (but also by humans !-)

<> Predecessors and paradigms:

- <> LaTeX
- <> M4
- <> Iout
- <> SGML (but *not* its tag omission !-)

<> Means:

- <> compiler based
- <> only one escape character
  (plus one comment lead-in, both configurable)
  d2d: # / and /
  xml: < > / " ' = <!-- -- --> [ ]] <? &
  ; . . . (plus DTD %)
- <> tag inference (of nearly all closing and some opening tags)
- <> totally implicit tags for short but highly structured data items
- <> explicitly addressing computer laymen:
  robust parsing,
  acceptance of incomplete sources,
  generation of bug fix proposals,
  graphic documentation (WIRTH diagrams)

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- <> compiler based
- <> only one escape character
  (plus one comment lead-in, both configurable)
  d2d: `#` `/` and `/`
  xml: `<` `>` `/` `"` `'` `=` `<!--` `--` `-->` `[` `]]` `<?` `&`
  `;` . . . (plus DTD `%`)
- <> tag inference (of nearly all closing and some opening tags)
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- <> explicitly addressing computer laymen:
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  acceptance of incomplete sources,
  generation of bug fix proposals,
  graphic documentation (WIRTH diagrams)

<> Specially suited for ...

- <> Poets, Essayists, Novelists, and domain experts
- <> technical descriptions and multiple-use source texts
- <> XSL-T powered content management
- <> semi-structured data bases, technical configuration data
- <> data migration, incremental formalisation of legacy texts, grammar refinement
- <> voice input
- <> semantic driven document types, data structures and mark-up

<> Successfully applied for ...

- <> book-keeping
- <> music theory analysis
- <> roman à clef
- <> textual data base

- **(Simple ideas but complicated consequences !-)**
- **Combination of advanced technologies:**
  - Two levels of parsing:
    Top-level explicit open tags
    (XML style LL(1) parsing)
  - plus tag inference:
    nearly all closing tags; some opening tags
  - Lower level of tag-less character parsers
    (Non-deterministic parsing)
  - Parametrization by rewriting
  - Input synthesis for error recovery
  - Multi-lingual documentation infrastructure
  - Special mode for XSLT sources

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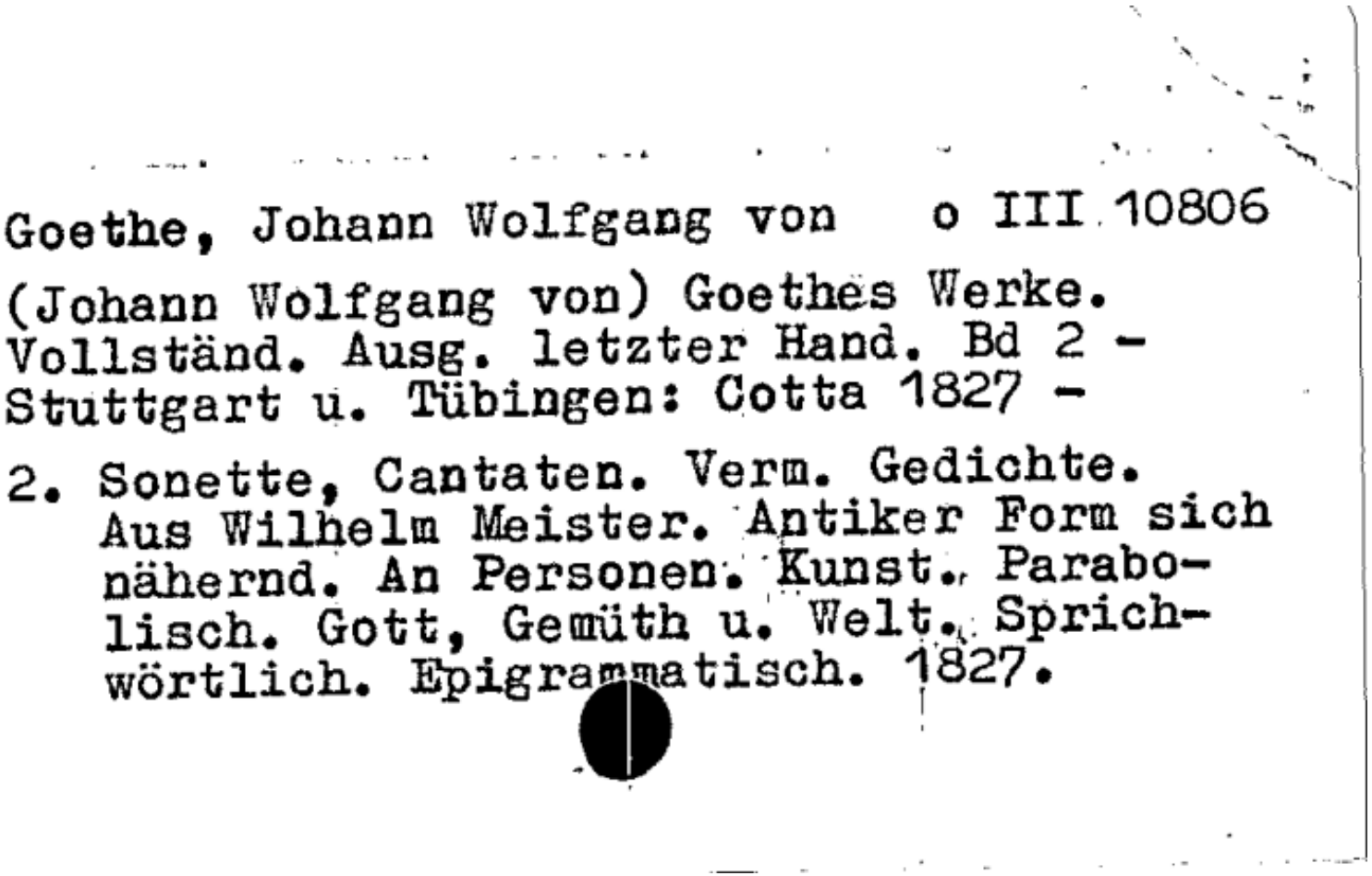
Incremental Formalization – Photo



Goethe, Johann Wolfgang von o III 10806

(Johann Wolfgang von) Goethes Werke.
Vollständ. Ausg. letzter Hand. Bd 2 -
Stuttgart u. Tübingen: Cotta 1827 -

2. Sonette, Cantaten. Verm. Gedichte.
Aus Wilhelm Meister. Antiker Form sich
nähernd. An Personen. Kunst. Parabo-
lisch. Gott, Gemüth u. Welt. Sprich-
wörtlich. Epigrammatisch. 1827.

Incremental Formalization – OCR

```
Goethe, Johann Wolfgang von o III 10806

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VOllstand. Ausg. letzter Hand. Bd 2 -
Stuttgart u. Tübingen:  Cotta 1827 -

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   nähernd. An Personen. Kunst. Parabo-
   lisch. Gott, Gemüth u. Welt. Sprich-
   wörtlich. EpigraMMatisch. 1827.
```

Incremental Formalization – Text Type Declared

```
#d2d text using katalog:kartei_vor_1946
Goethe, Johann Wolfgang von o III 10806

(Johann Wolfgang von) Goethes Werke.
VOllstand. Ausg. letzter Hand. Bd 2 -
Stuttgart u. Tübingen:  Cotta 1827 -

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   Aus Wilhelm Meister. Antiker Form sich
   nähernd. An Personen. Kunst. Parabo-
   lisch. Gott, Gemüth u. Welt. Sprich-
   wörtlich. EpigraMMatisch. 1827.
#eof
```

Incremental Formalization – First Mark-Up

```
#d2d text using katalog:kartei_vor_1946
#author Goethe, Johann Wolfgang von #sign o III 10806#/

(Johann Wolfgang von) Goethes Werke.
VOllstand. Ausg. letzter Hand. Bd 2 -
Stuttgart u. Tübingen:  Cotta 1827 -

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   lisch. Gott, Gemüth u. Welt. Sprich-
   wörtlich. EpigraMMatisch. 1827.
#eof
```

Incremental Formalization – More Mark-Up

```
#d2d text using katalog:kartei_vor_1946
#author Goethe, Johann Wolfgang von #sign o III 10806#/

(Johann Wolfgang von) #title Goethes Werke.
VOllstand. Ausg. letzter Hand. #vol 2 // -
#place Stuttgart u. Tübingen #publisher Cotta #year 1827 #/

2. Sonette, Cantaten, Verm. Gedichte.
   Aus Wilhelm Meister. Antiker Form sich
   nähernd. An Personen. Kunst. Parabo-
   lisch. Gott, Gemüth u. Welt. Sprich-
   wörtlich. EpigraMMatisch. 1827.
#eof
```

Incremental Formalization by Character Parsers

```
#d2d text using katalog:kartei_vor_1946
#author Goethe, Johann Wolfgang von #sign o III 10806#/

(Johann Wolfgang von) #title Goethes Werke.
VOllstand. Ausg. letzter Hand. #vol 2 // -
#place Stuttgart u. Tübingen #publisher Cotta #year 1827 #/
-
```

tags kartei_vor_1946 = (author & title & sign), vol?,
(place? & publisher? & year?)
tags author, title, place, publisher = #chars
tags sign, vol, year = #chars

Incremental Formalization by Character Parsers

```
#d2d text using katalog:kartei_vor_1946
#author Goethe, Johann Wolfgang von #sign o III 10806#/

(Johann Wolfgang von) #title Goethes Werke.
VOllstand. Ausg. letzter Hand. #vol 2 // -
#place Stuttgart u. Tübingen #publisher Cotta #year 1827 #/
-
```

tags kartei_vor_1946 = (author & title & sign), vol?,
(place? & publisher? & year?)
tags author, title, place, publisher = #chars
chars year = ('0'..'9')~('0'..'9')~('0'..'9')~('0'..'9')
chars vol = ('1'..'9') ~ ('0'..'9')* ~ ('a'..'z')?

Incremental Formalization by Character Parsers

```
#d2d text using katalog:kartei_vor_1946
#author Goethe, Johann Wolfgang von #sign o III 10806#/

(Johann Wolfgang von) #title Goethes Werke.
VOllstand. Ausg. letzter Hand. #vol 2 // -
#place Stuttgart u. Tübingen #publisher Cotta #year 1827 #/
-
```

tags kartei_vor_1946 = (author & title & sign), vol?,
(place? & publisher? & year?)
tags author, title, place, publisher = #chars
chars year = ('0'..'9')~('0'..'9')~('0'..'9')~('0'..'9')
chars vol = ('1'..'9') ~ ('0'..'9')* ~ ('a'..'z')?
chars sign = [series ('o' | 'p' | "Coll")],
[group ('I'|'V'|'X'|'L'|'C')+]?, [num ('0'..'9')+]

Incremental Formalization by Character Parsers

```
#d2d text using katalog:kartei_vor_1946
#author Goethe, Johann Wolfgang von #sign o III 10806#/

(Johann Wolfgang von) #title Goethes Werke.
VOllstand. Ausg. letzter Hand. #vol 2 // -
#place Stuttgart u. Tübingen #publisher Cotta #year 1827 #/
-
```

tags kartei_vor_1946 = (author & title & sign), vol?,
(place? & publisher? & year?)
tags author, title, place, publisher = #chars
chars year = ('0'..'9')~('0'..'9')~('0'..'9')~('0'..'9')
chars vol = ('1'..'9') ~ ('0'..'9')* ~ ('a'..'z')?
chars sign = [series ('o' | 'p' | "Coll")],
[group ('I'|'V'|'X'|'L'|'C')+]?, [num ('0'..'9')+]

<sign><series>o</series><group>III</group><num>10806</num></sign>

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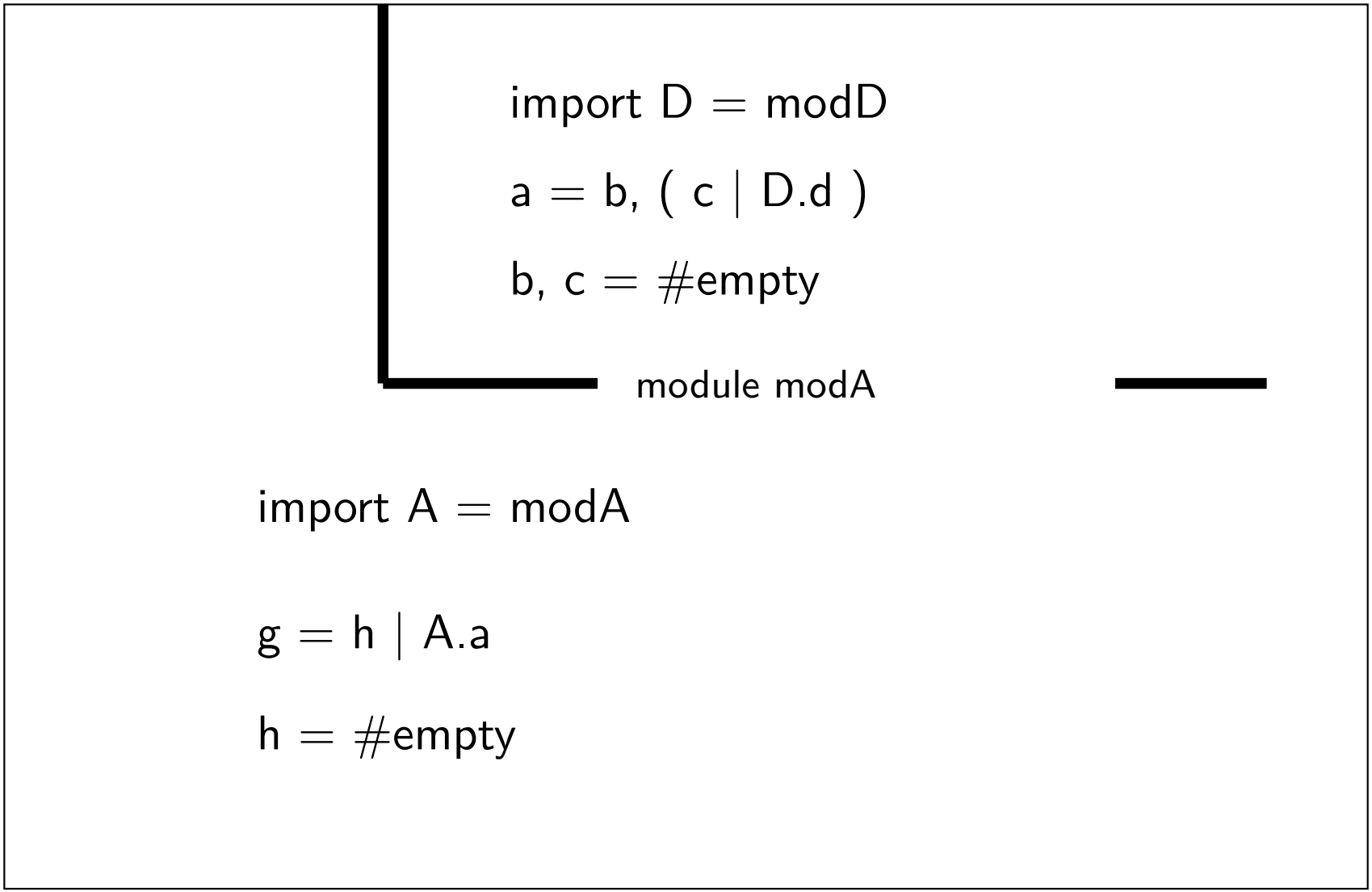
- d2d works immediately on w3c DTDs.
- But its own definition format adds ...
  - character parsers
  - unification of child elements and attributes
  - multi-lingual documentation
  - parametrization by rewriting

Rewriting for Parametrization

<> Operator ^(.../...) means:
every reference can be seen as a parameter
= "spontaneous rewriting"
= no "pre-wiring" is necessary
(which is often not sensibly *possible* !-)

<> Operator @ means:
All element definitions can serve as content types
= no special definition pool necessary

Parametrization I



Parametrization I

Inject local expression into imported expression:

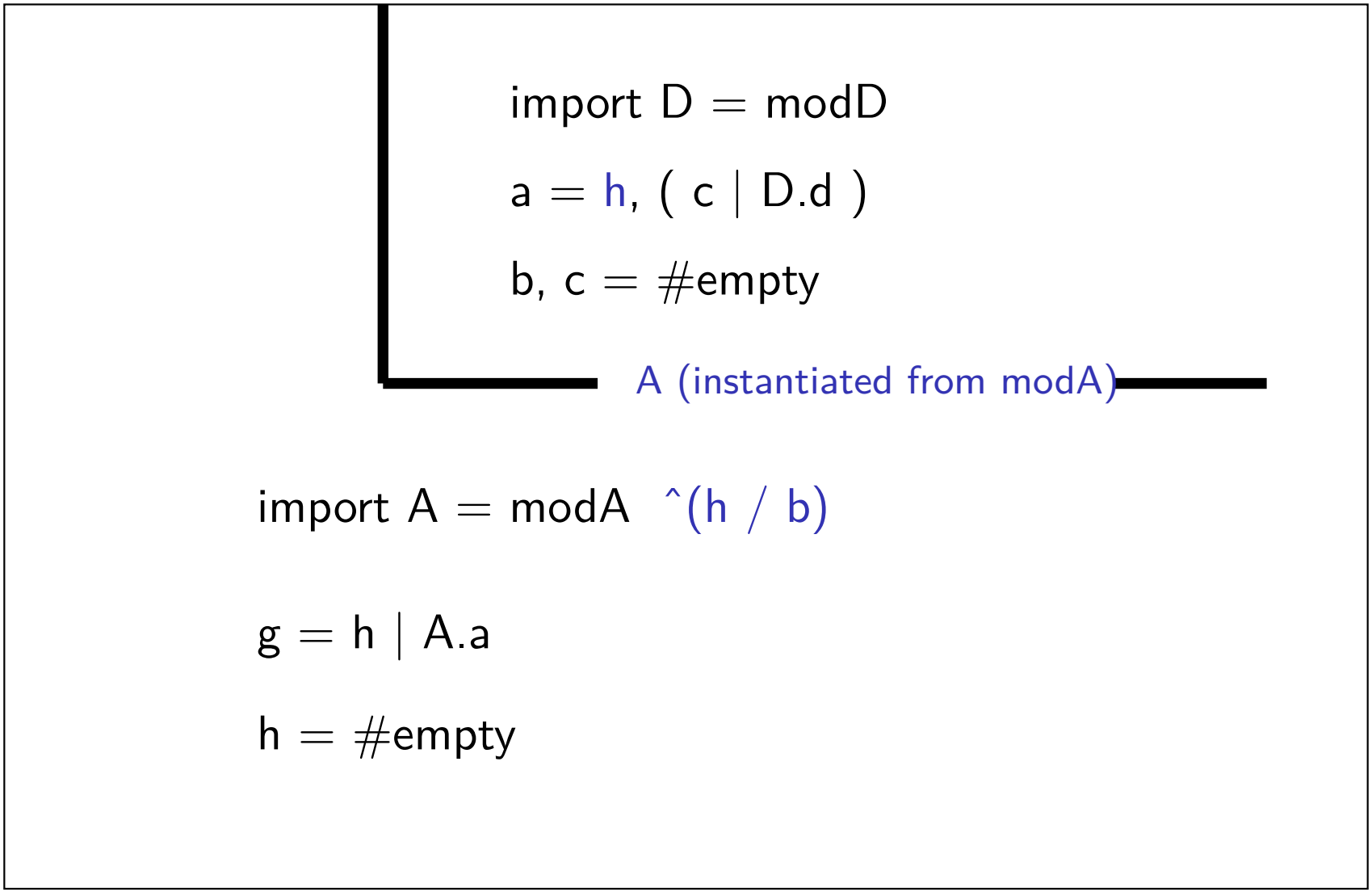
```
import D = modD

a = b, ( c | D.d )

b, c = #empty
```

module modA

```
import A = modA  ^(h / b)

g = h | A.a

h = #empty
```

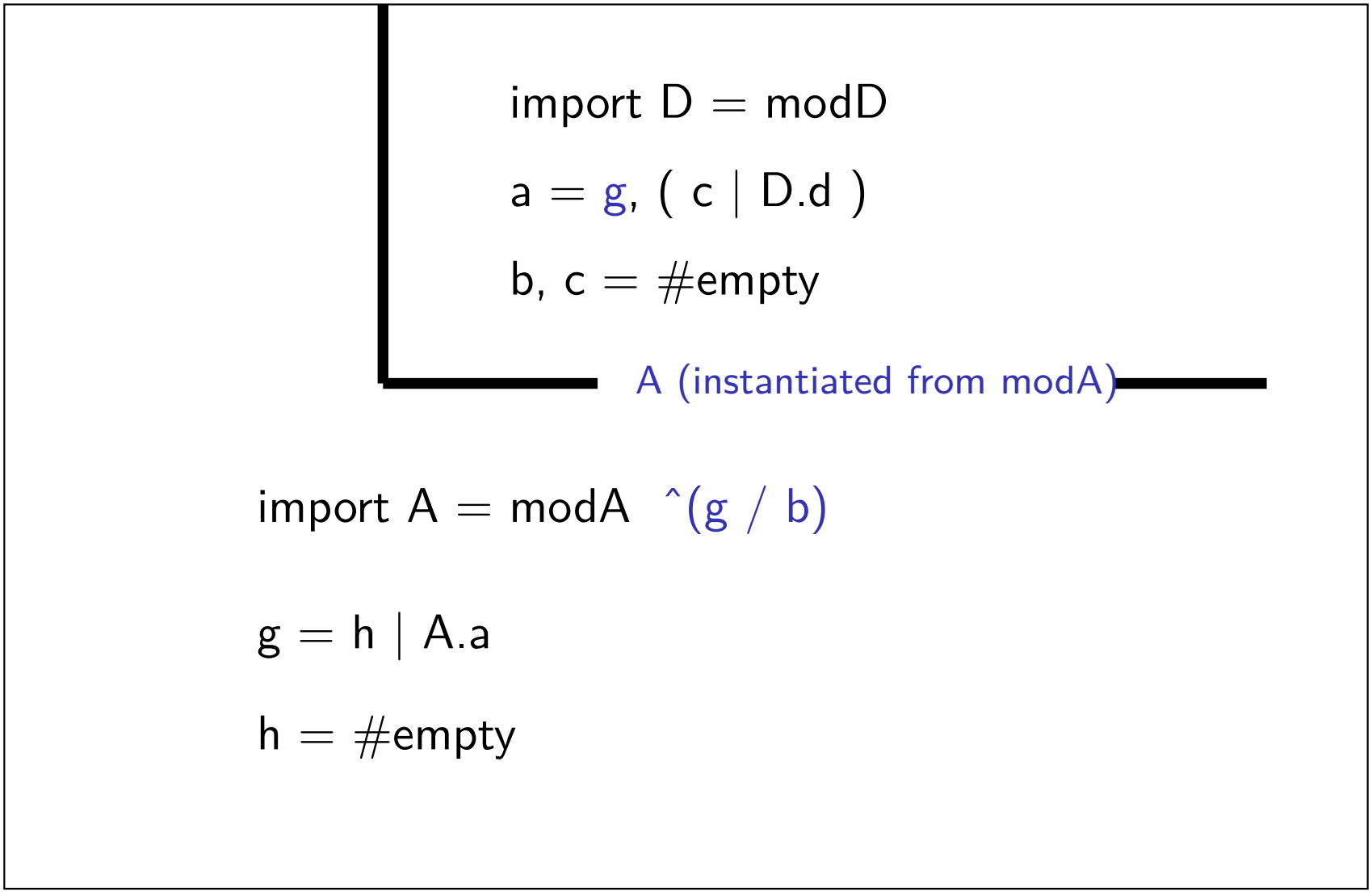
Parametrization I

Inject local expression into imported expression:



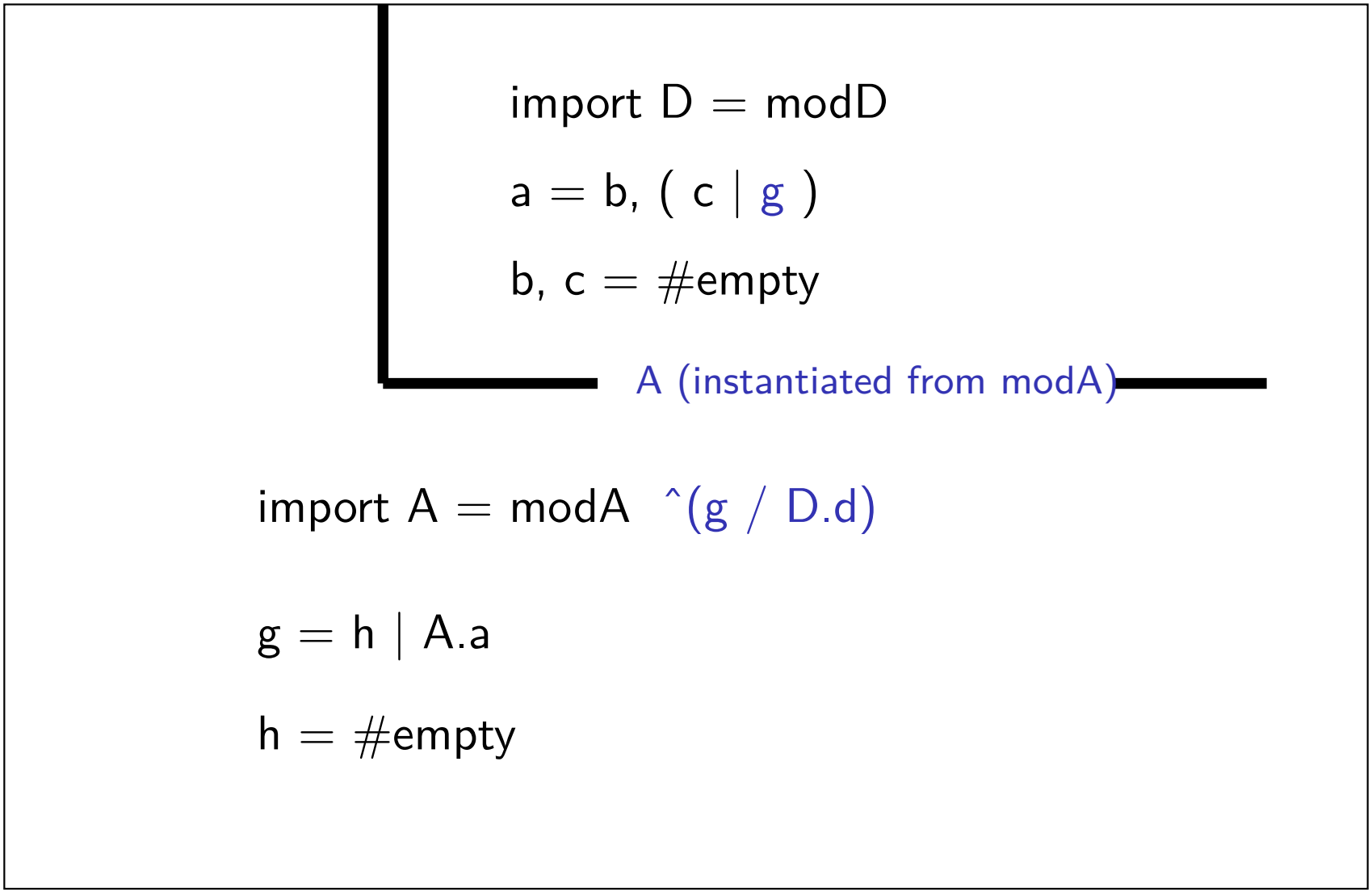
Parametrization I

Inject local expression into imported expression, making cycle:



Parametrization I

Inject local expression into imported expression, making cycle:



Parametrization I

Inject imported expression into imported expression:

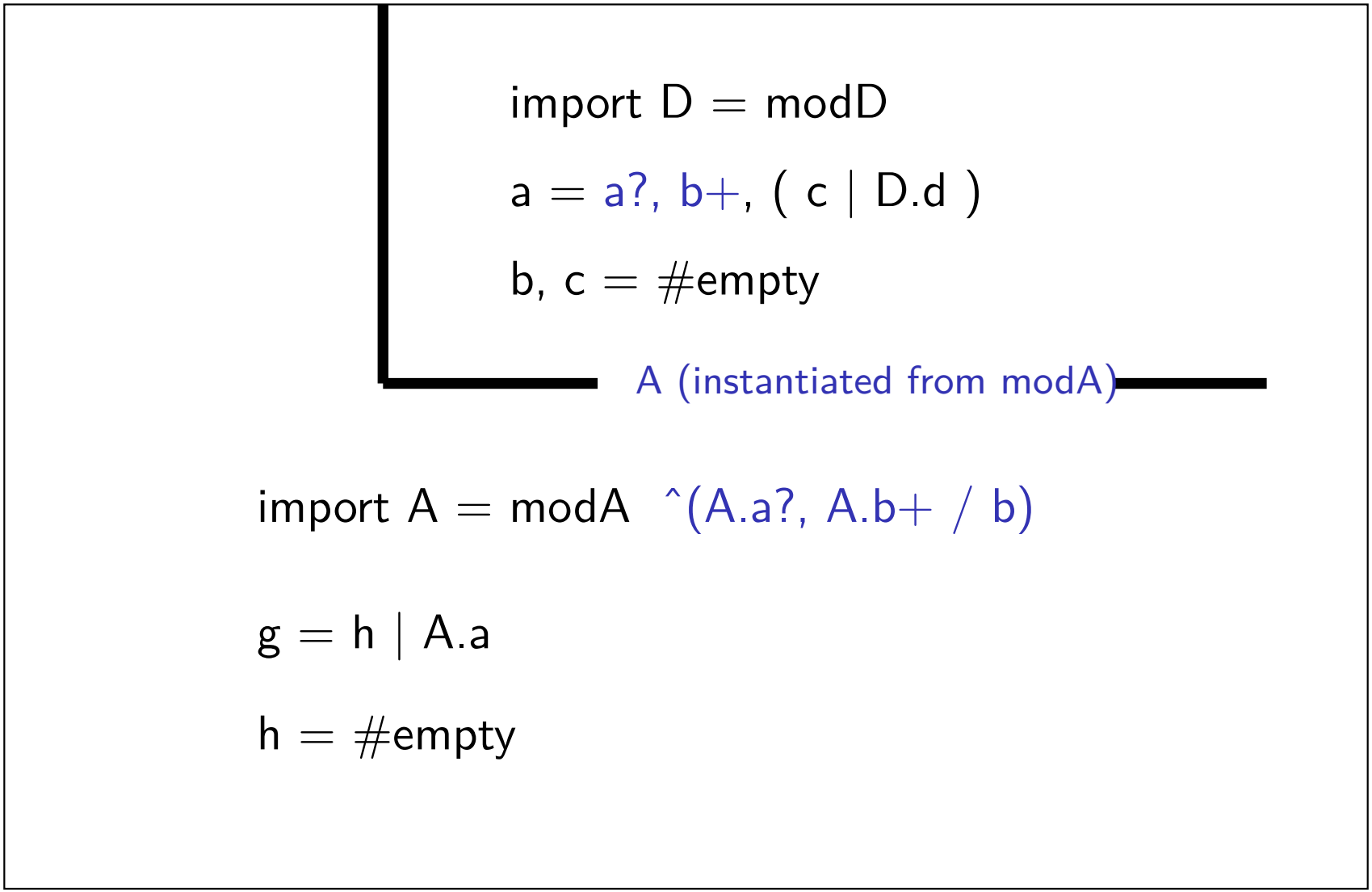
```
import D = modD

a = b, ( c | D.d )

b, c = #empty
```

module modA

```
import A = modA  ^(A.a?, A.b+ / b)

g = h | A.a

h = #empty
```

Parametrization I

Inject imported expression into imported expression:



Parametrization I

Use indirect import / imports are re-exported:

```
import D = modD ^( b | c / x)

a = b, ( c | D.d )

b, c = #empty
```

A (instantiated from modA)

```
import A = modA

g = h | A.a | A.D.d

h = #empty
```

Parametrization I

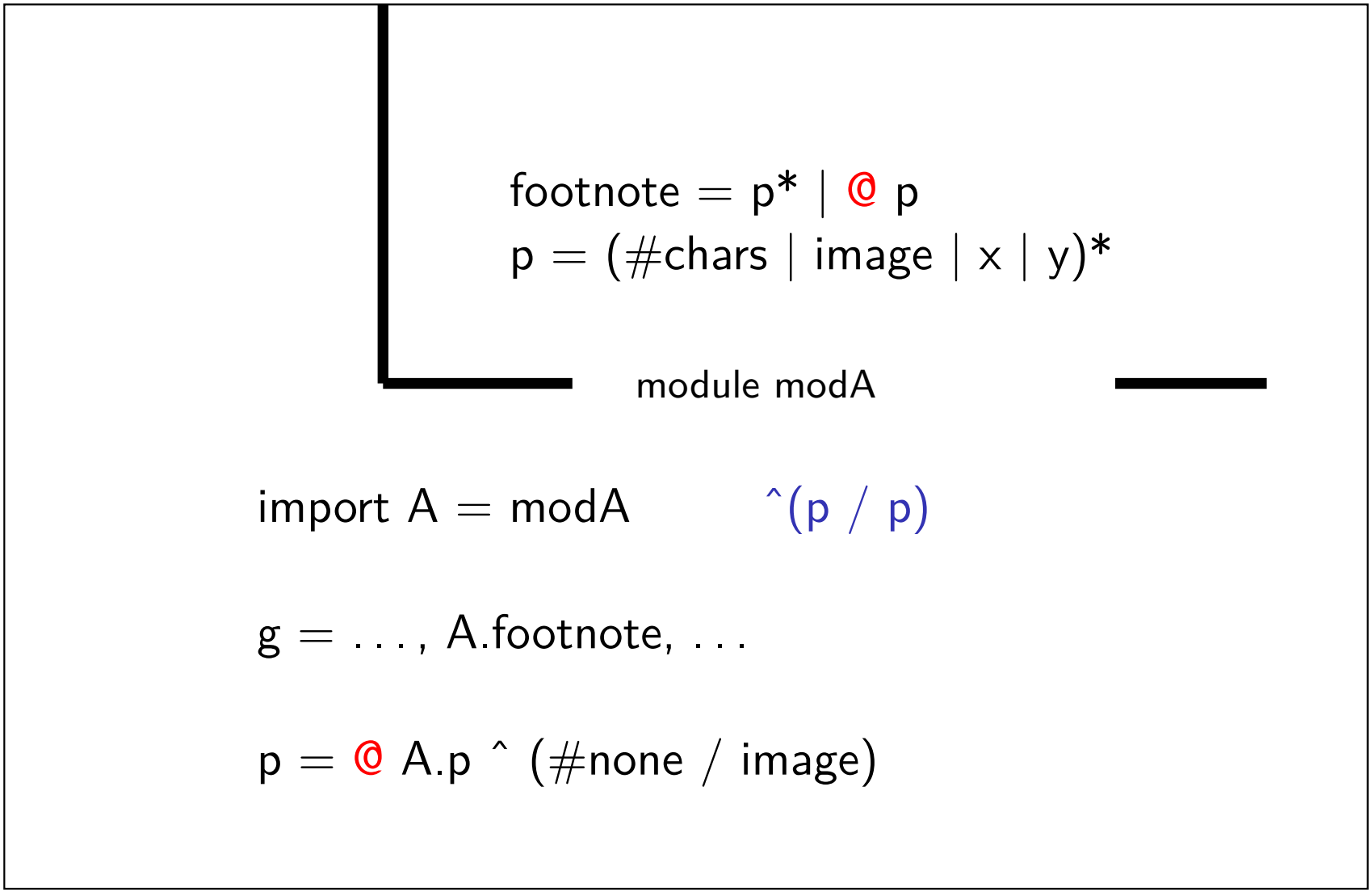
Replace whole module import, e.g. with locale:

```
module modA

  import D = modD modE

  a = b, ( c | D.d )

  b, c = #empty
```

```
import A = modA ^(E / D)
import E = modE
g = h | A.a

h = #empty
```

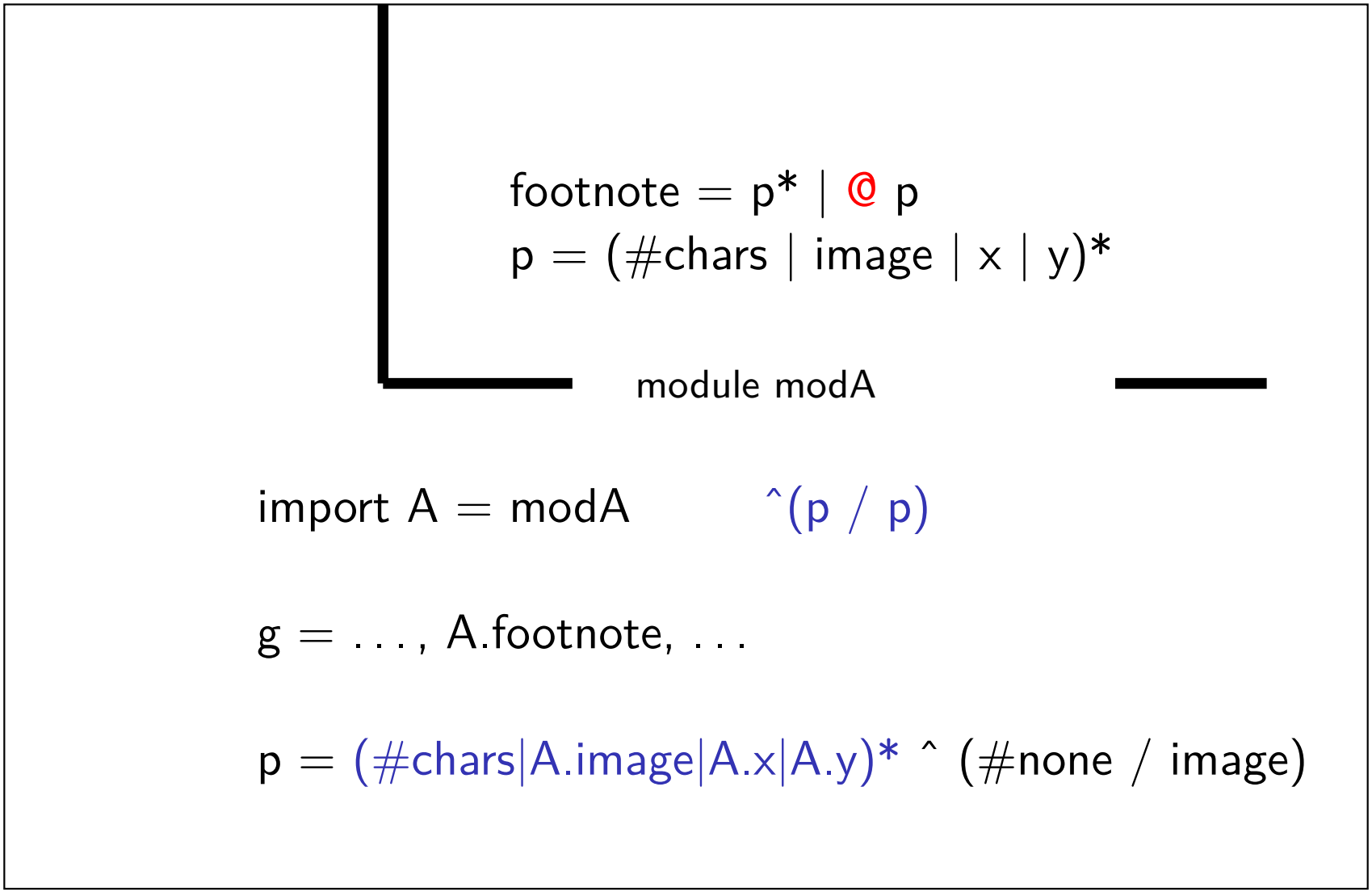
Parametrization II

Rewrite reference to rewritten expression:



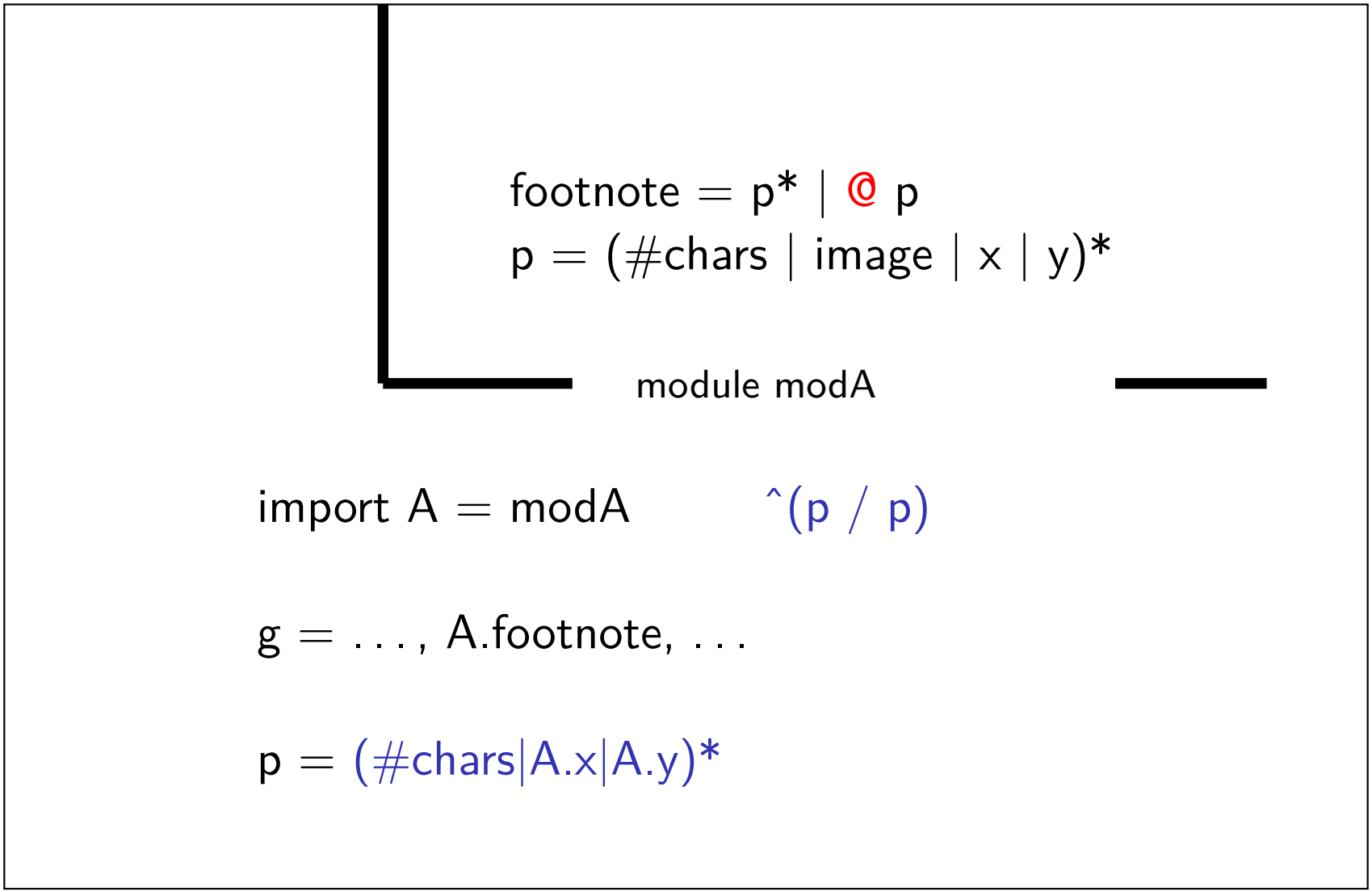
Parametrization II

Operator "@" means contents:

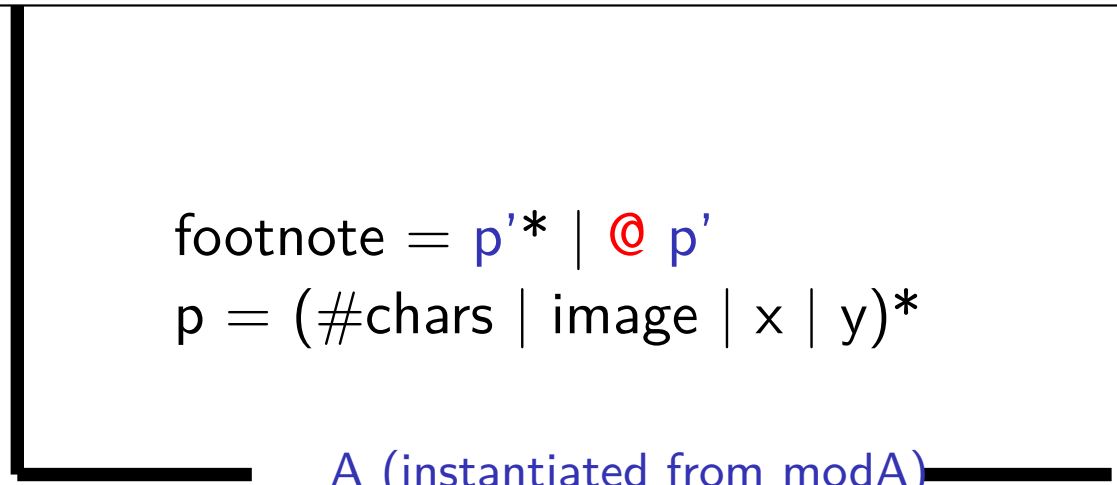


Parametrization II

Rewriting to "#none" means elimination:



Parametrization II



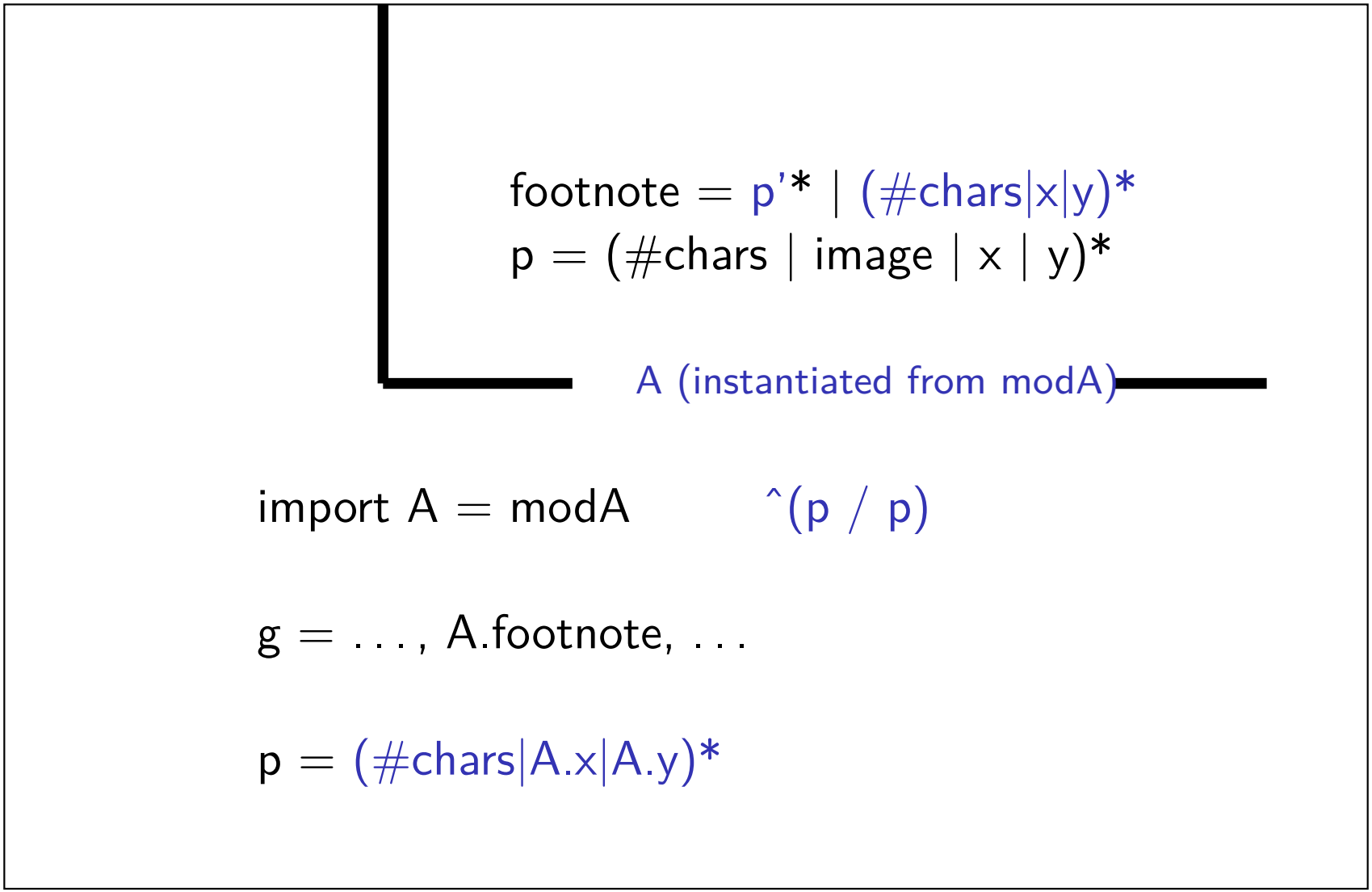
import A = modA ^(p / p)

g = . . . , A.footnote, . . .

p = (#chars|A.x|A.y)*

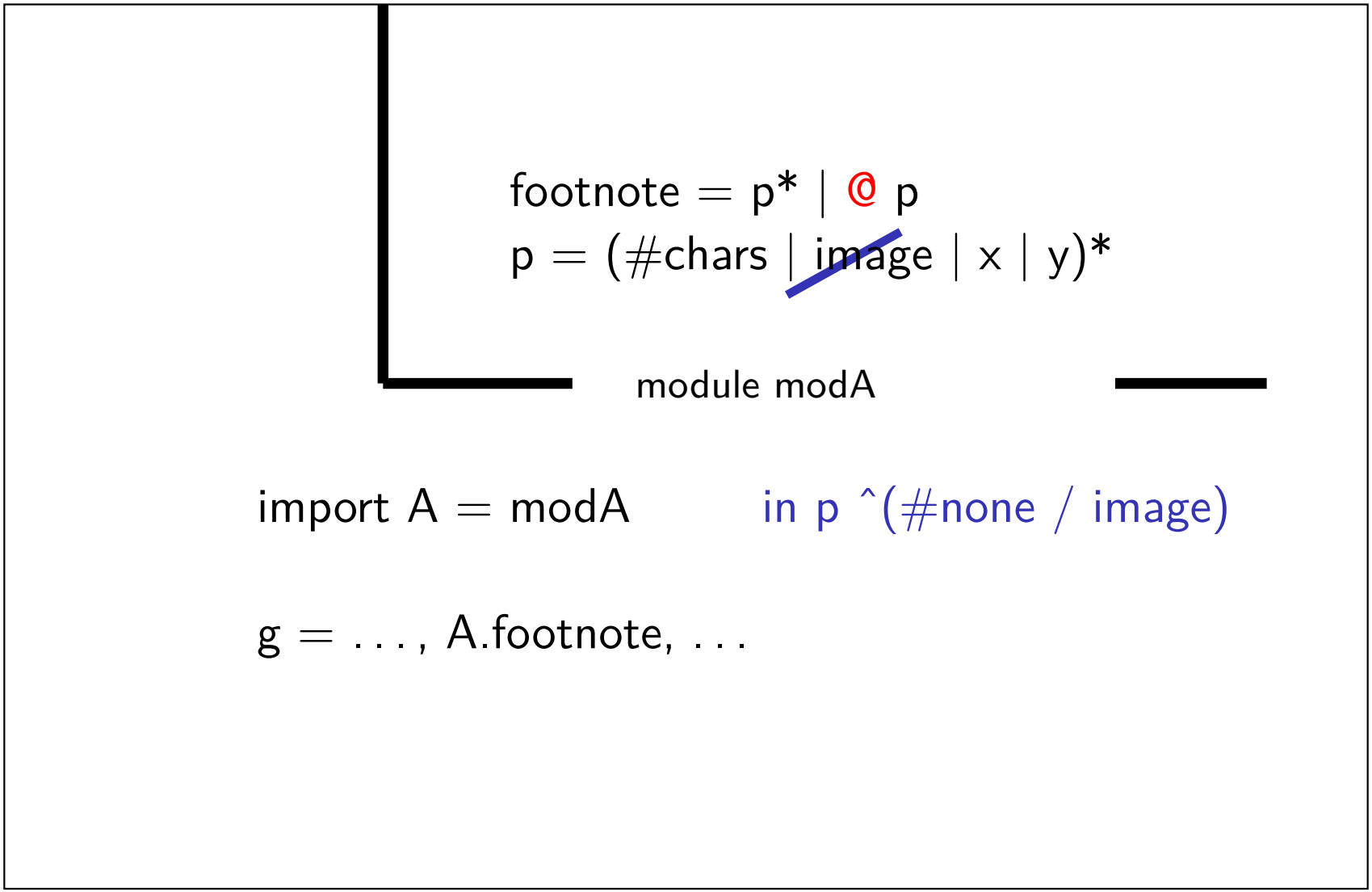
Parametrization II

Operator "@" means contents:



Parametrization II

For convenience: Local module rewriting:



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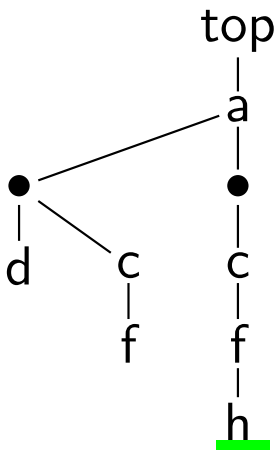
Signalling of missing content before an open tag

result tree



regexp stack

$\boxed{top}$

$\boxed{a}, b$

$(\boxed{c}\ \&\ d)^*, e^+$

$\boxed{f}, g?$

$\boxed{h}$

#a #d #c #f #c #f #h

$$\begin{aligned} top &= a, b \\ a &= (c \& d)^*, e^+ \qquad b = i \mid k \\ c &= f, g? \\ f &= h? \\ d, e, g &= \#\text{chars} \qquad h, i, k = \#\text{empty} \end{aligned}$$

Signalling of missing content before an open tag

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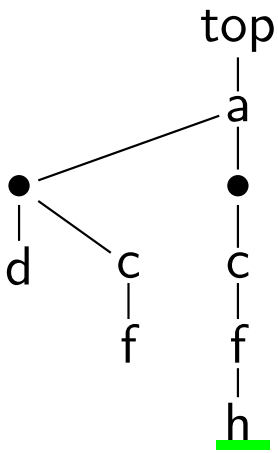

#d
#/c
#g
#/f
#/h

regexp stack

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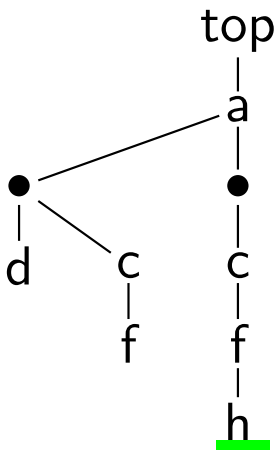

regexp stack

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$\boxed{h}$ ▮

#a #d #c #f #c #f #h ▮ #b

$$\begin{aligned} \text{top} &= a, b \\ a &= (c \& d)^*, e^+ \qquad b = i \mid k \\ c &= f, g? \\ f &= h? \\ d, e, g &= \#\text{chars} \qquad h, i, k = \#\text{empty} \end{aligned}$$

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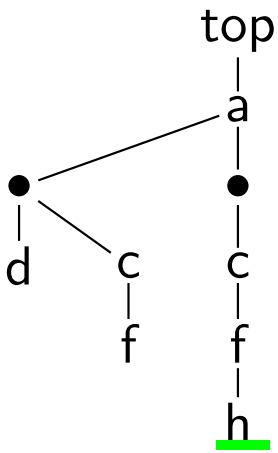
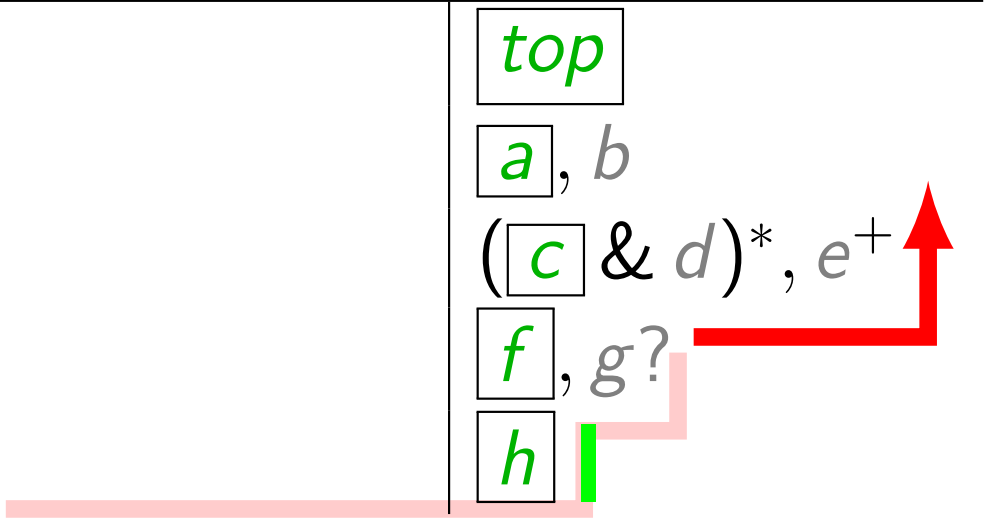


regexp stack



#a #d #c #f #c #f #h | #b

$$\begin{aligned} \text{top} &= a, b \\ a &= (c \& d)^*, e^+ \qquad b = i \mid k \\ c &= f, g? \\ f &= h? \\ d, e, g &= \#\text{chars} \qquad h, i, k = \#\text{empty} \end{aligned}$$

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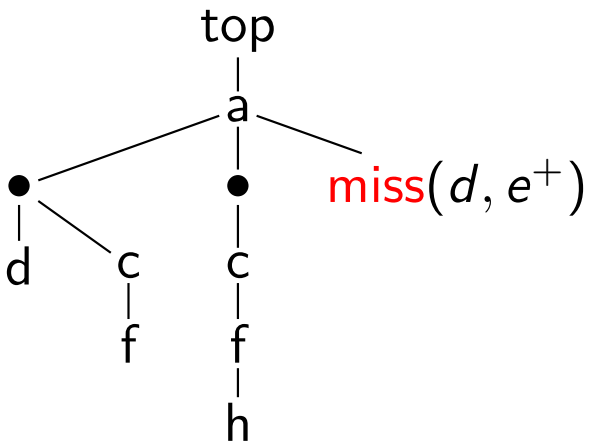
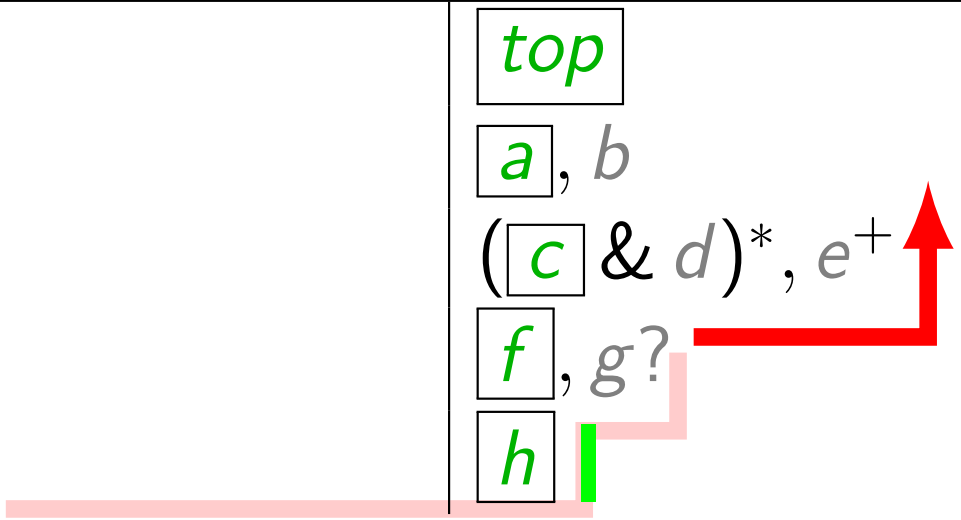


regexp stack



#a #d #c #f #c #f #h | #b

$$\begin{aligned} \text{top} &= a, b \\ a &= (c \& d)^*, e^+ \qquad b = i \mid k \\ c &= f, g? \\ f &= h? \\ d, e, g &= \#\text{chars} \qquad h, i, k = \#\text{empty} \end{aligned}$$

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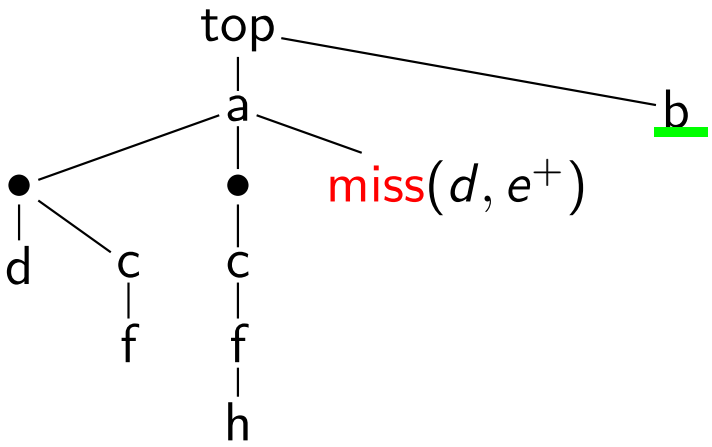
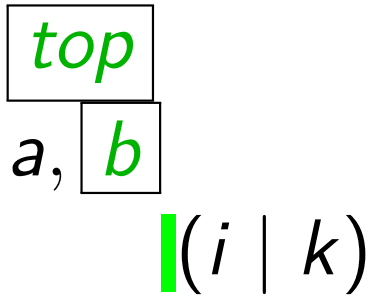


regexp stack

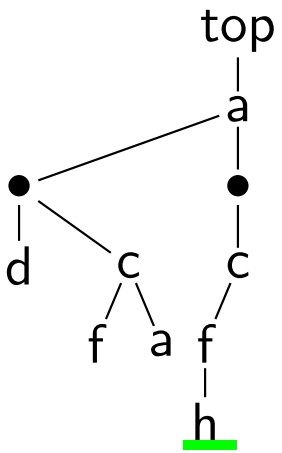


#a #d #c #f #c #f #h #b ...

$$\begin{aligned} \text{top} &= a, b \\ a &= (c \& d)^*, e^+ \qquad b = i \mid k \\ c &= f, g? \\ f &= h? \\ d, e, g &= \#\text{chars} \qquad h, i, k = \#\text{empty} \end{aligned}$$

Signalling of missing content before a close tag

result tree



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$\boxed{f}, a$

$\boxed{h}$

#a #d #c #f #a #c #f #h

$$\begin{aligned} top &= a, b \\ a &= (c \& d)^*, e^+ \qquad b = i \mid k \\ c &= f, a \\ f &= h? \\ d, e, g &= \#\text{chars} \qquad h, i, k = \#\text{empty} \end{aligned}$$

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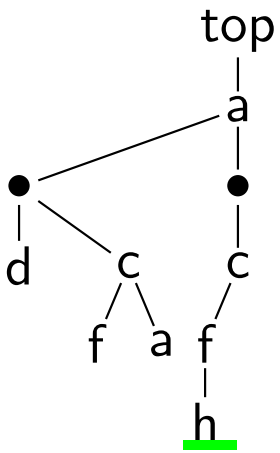

regexp stack

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$\boxed{a}, b$

$(\boxed{c} \,\&\, d)^*, e^+$

$\boxed{f}, a$

$\boxed{h}$

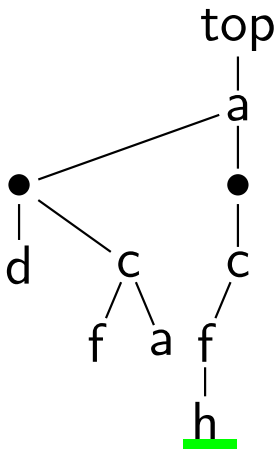
#a
#/f
#/h

#a #d #c #f #a #c #f #h

$$\begin{aligned} top &= a, b \\ a &= (c \& d)^*, e^+ \qquad b = i \mid k \\ c &= f, a \\ f &= h? \\ d, e, g &= \#\text{chars} \qquad h, i, k = \#\text{empty} \end{aligned}$$

Signalling of missing content before a close tag

result tree



regexp stack

$\boxed{top}$

$\boxed{a}, b$

$(\boxed{c} \,\&\, d)^*, e^+$

$\boxed{f}, a$

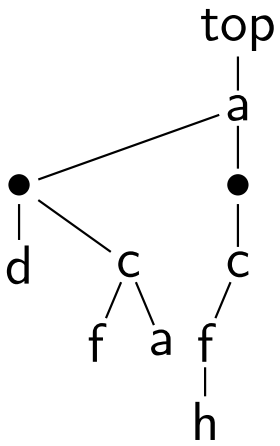
$\boxed{h}$ ▮

#a #d #c #f #a #c #f #h ▮ #/a

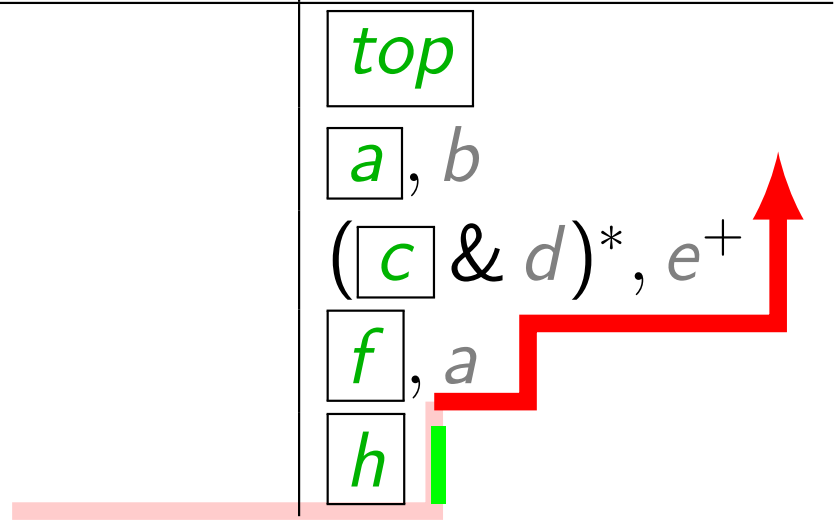
$$\begin{aligned} \text{top} &= a, b \\ a &= (c \& d)^*, e^+ \qquad b = i \mid k \\ c &= f, a \\ f &= h? \\ d, e, g &= \#\text{chars} \qquad h, i, k = \#\text{empty} \end{aligned}$$

Signalling of missing content before a close tag

result tree



regexp stack

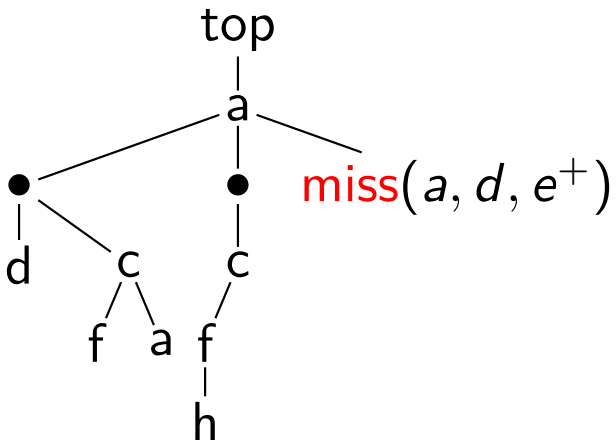


#a #d #c #f #a #c #f #h | #/a

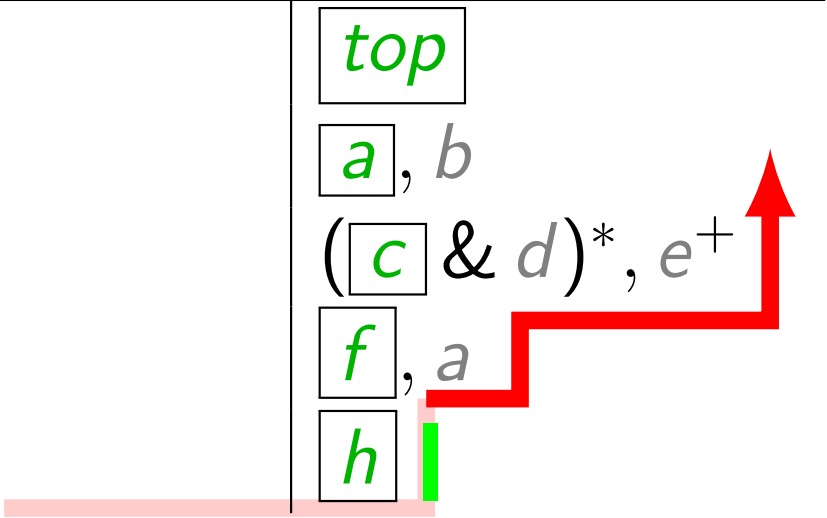
$$\begin{aligned} \text{top} &= a, b \\ a &= (c \& d)^*, e^+ \qquad b = i \mid k \\ c &= f, a \\ f &= h? \\ d, e, g &= \#\text{chars} \qquad h, i, k = \#\text{empty} \end{aligned}$$

Signalling of missing content before a close tag

result tree



regexp stack

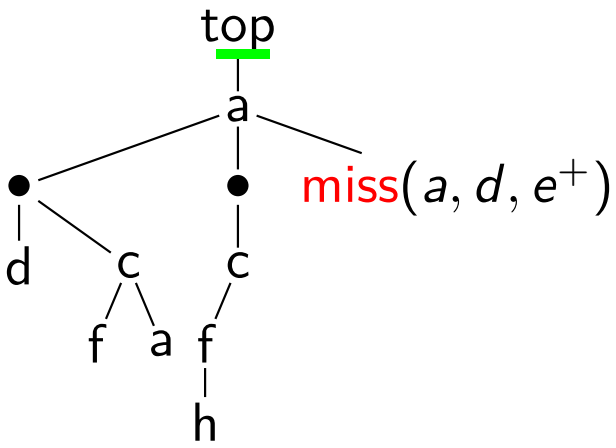


#a #d #c #f #a #c #f #h | #/a

$$\begin{aligned} \text{top} &= a, b \\ a &= (c\&d)^*, e^+ \qquad b = i \mid k \\ c &= f, a \\ f &= h? \\ d, e, g &= \#\text{chars} \qquad h, i, k = \#\text{empty} \end{aligned}$$

Signalling of missing content before a close tag

result tree



regexp stack

top

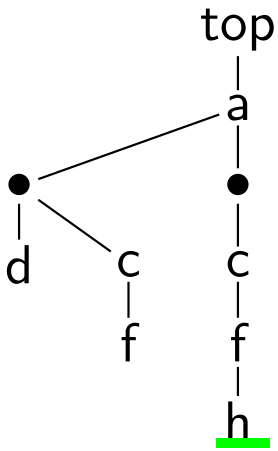
a | *b*

#a #d #c #f #a #c #f #h #/a | ...

$$\begin{aligned} \text{top} &= a, b \\ a &= (c\&d)^*, e^+ \qquad b = i \mid k \\ c &= f, a \\ f &= h? \\ d, e, g &= \#\text{chars} \qquad h, i, k = \#\text{empty} \end{aligned}$$

Signalling superfluous input

result tree



regexp stack

$\boxed{top}$

$\boxed{a}, b$

$(\boxed{c} \,\&\, d)^*, e^+$

$\boxed{f}, g?$

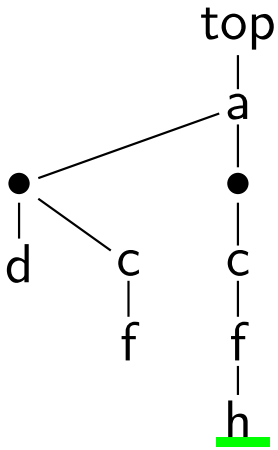
$\boxed{h}$

#a #d #c #f #c #f #h

$$\begin{aligned} top &= a, b \\ a &= (c \& d)^*, e^+ \qquad b = i \mid k \\ c &= f, g? \\ f &= h? \\ d, e, g &= \#\text{chars} \qquad h, i, k = \#\text{empty} \end{aligned}$$

Signalling superfluous input

result tree



regexp stack

$\boxed{top}$

$\boxed{a}, b$

$(\boxed{c}\ \&\ d)^*, e^+$

$\boxed{f}, g?$

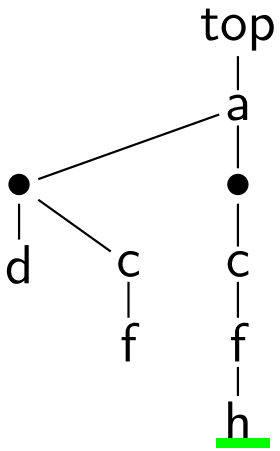
$\boxed{h}$

#a #d #c #f #c #f #h #x γ #g

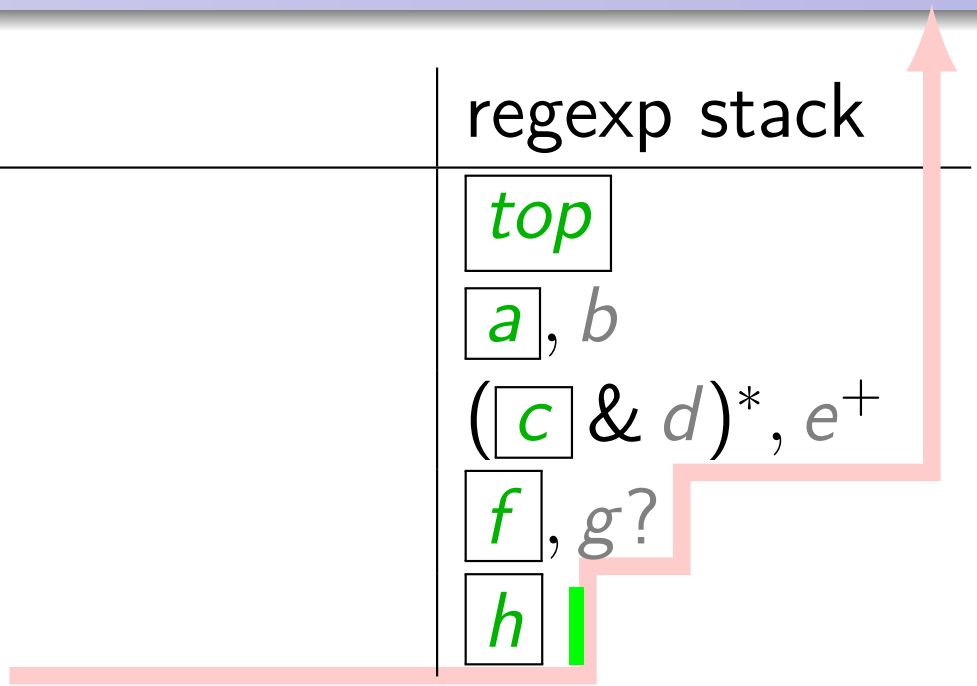
$$\begin{aligned} top &= a, b \\ a &= (c \& d)^*, e^+ \qquad b = i \mid k \\ c &= f, g? \\ f &= h? \\ d, e, g &= \#\text{chars} \qquad h, i, k = \#\text{empty} \end{aligned}$$

Signalling superfluous input

result tree



regexp stack

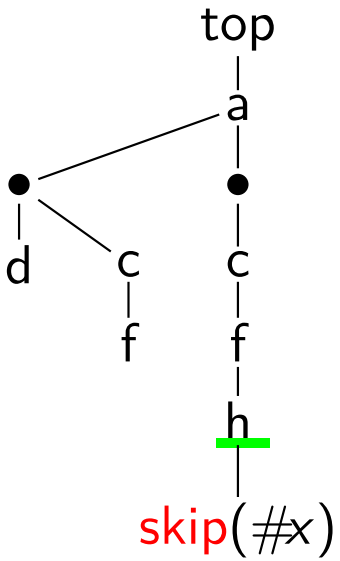


#a #d #c #f #c #f #h #x γ #g

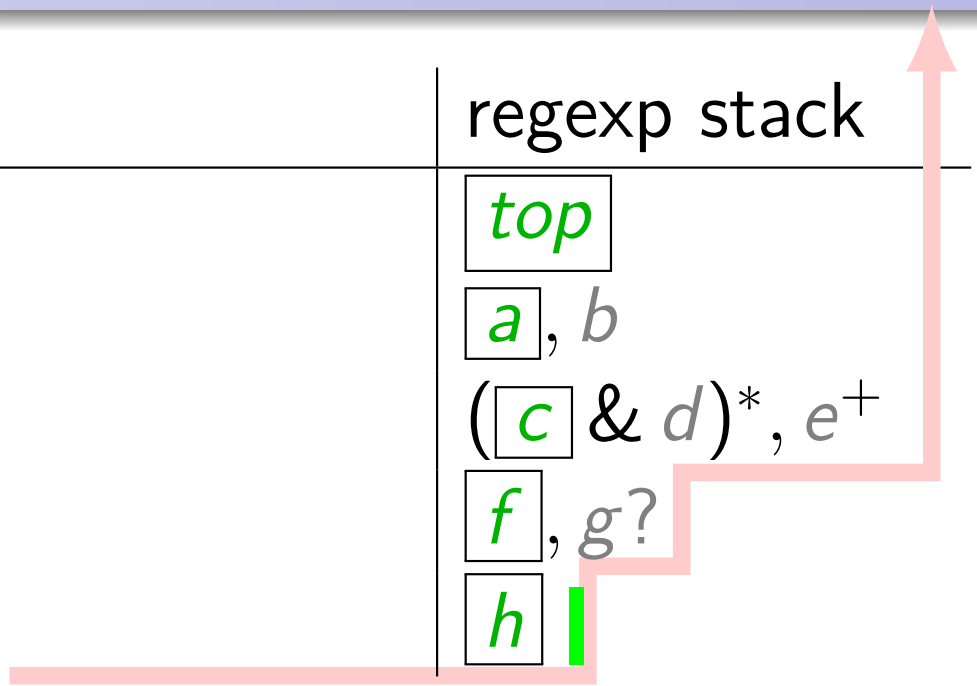
$$\begin{aligned} \text{top} &= a, b \\ a &= (c \& d)^*, e^+ \qquad b = i \mid k \\ c &= f, g? \\ f &= h? \\ d, e, g &= \#\text{chars} \qquad h, i, k = \#\text{empty} \end{aligned}$$

Signalling superfluous input

result tree



regexp stack

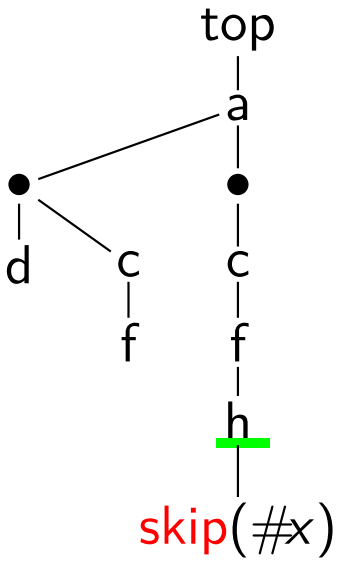


#a #d #c #f #c #f #h #x γ #g

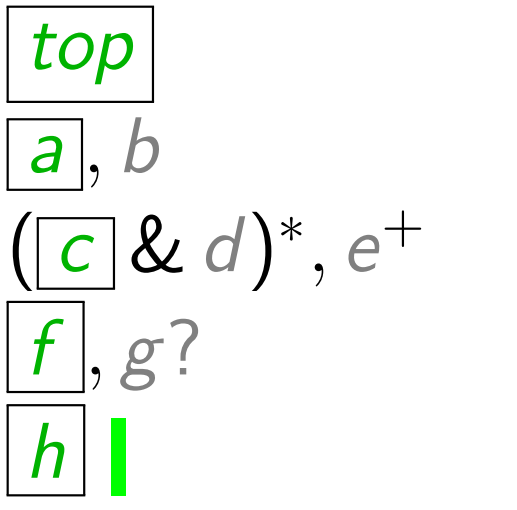
$$\begin{aligned} \text{top} &= a, b \\ a &= (c \& d)^*, e^+ \qquad b = i \mid k \\ c &= f, g? \\ f &= h? \\ d, e, g &= \#\text{chars} \qquad h, i, k = \#\text{empty} \end{aligned}$$

Signalling superfluous input

result tree



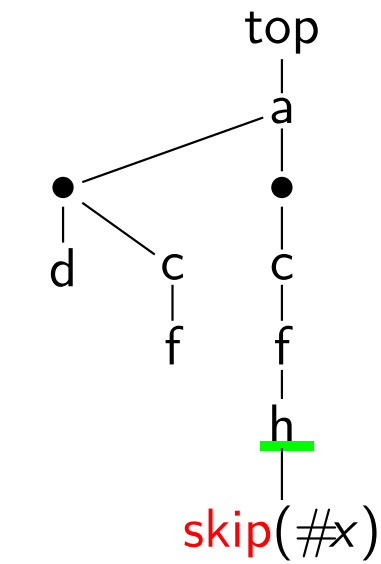
regexp stack



#a #d #c #f #c #f #h | γ #g

$$\begin{aligned} \text{top} &= a, b \\ a &= (c \& d)^*, e^+ \qquad b = i \mid k \\ c &= f, g? \\ f &= h? \\ d, e, g &= \#\text{chars} \qquad h, i, k = \#\text{empty} \end{aligned}$$

Signalling superfluous input



result tree

regexp stack

top

a, b

$(c \,\&\, d)^*, e^+$

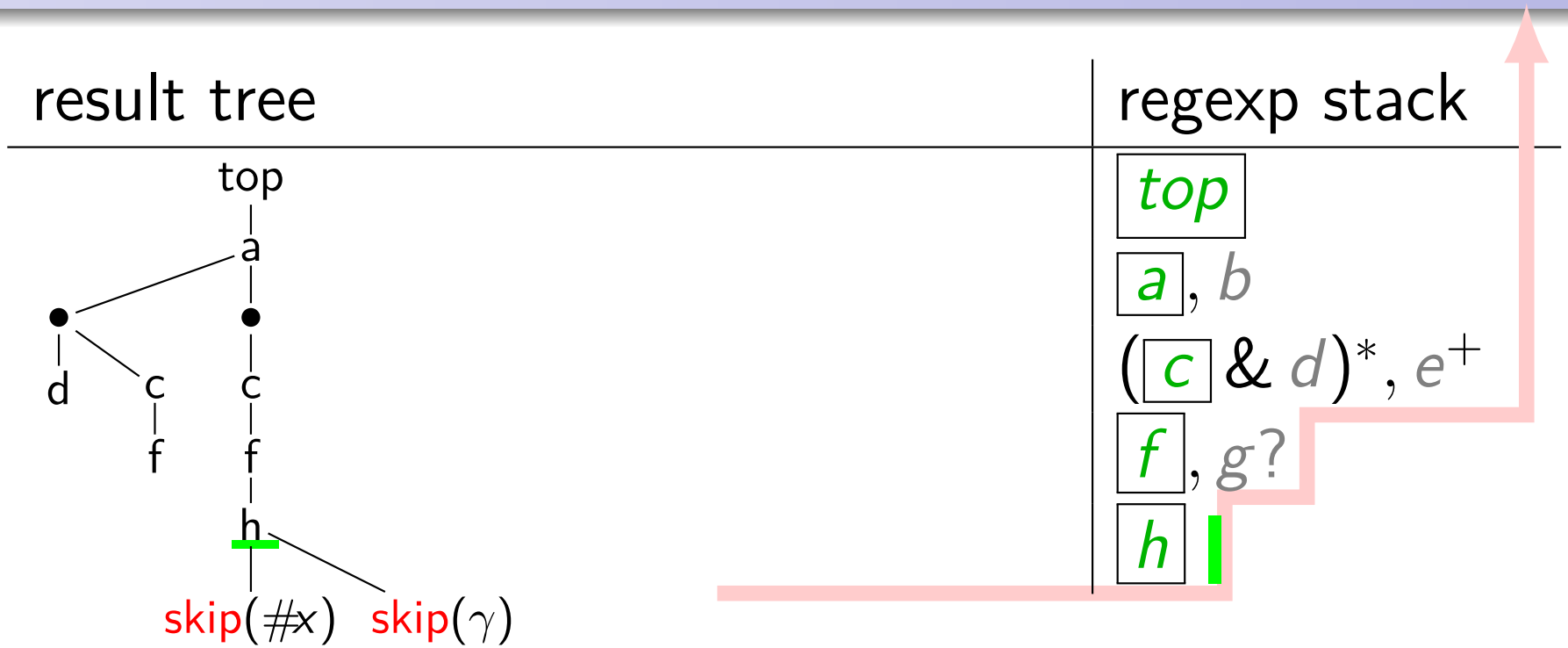
$f, g?$

h

$\#a\ \#d\ \#c\ \#f\ \#c\ \#f\ \#h \mid \gamma\ \#g$

$$\begin{aligned} top &= a, b \\ a &= (c \& d)^*, e^+ \qquad b = i \mid k \\ c &= f, g? \\ f &= h? \\ d, e, g &= \#\text{chars} \qquad h, i, k = \#\text{empty} \end{aligned}$$

Signalling superfluous input

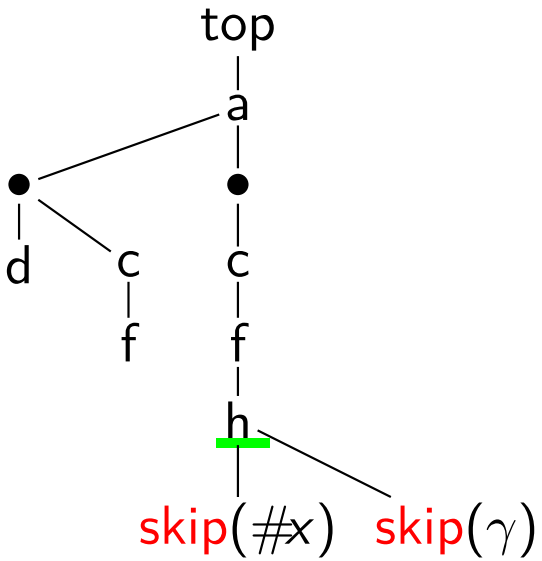


#a #d #c #f #c #f #h | γ #g

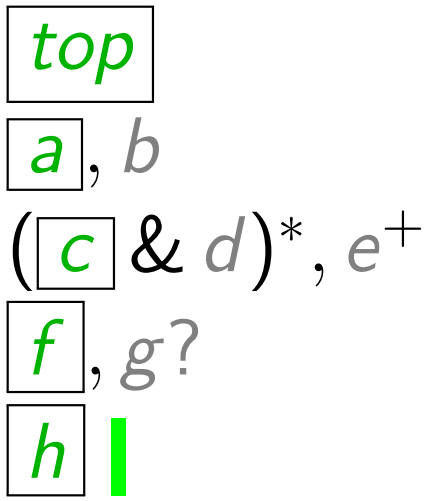
$$\begin{aligned} \text{top} &= a, b \\ a &= (c \& d)^*, e^+ \qquad b = i \mid k \\ c &= f, g? \\ f &= h? \\ d, e, g &= \#\text{chars} \qquad h, i, k = \#\text{empty} \end{aligned}$$

Signalling superfluous input

result tree



regexp stack



#a #d #c #f #c #f #h | #g ...

$$\begin{aligned} \text{top} &= a, b \\ a &= (c \& d)^*, e^+ \qquad b = i \mid k \\ c &= f, g? \\ f &= h? \\ d, e, g &= \#\text{chars} \qquad h, i, k = \#\text{empty} \end{aligned}$$

Possible rendering of embedded error messages:

In the last years, meta_tools have been successfully employed in very different medium-scale industrial, private and administrative applications.

#titel Components of # **#mt** // == #
#p (title)

The components of meta_tools range from small utility libraries, which can be used ubiquitously, up to large source code generating systems.

---

1 Goals and Principles of d2d

2 Input and Parsing

3 Modules and Parametrization

4 Error Recovery and Diagnosis

5 Documentation and Subsequent Processing

6 Comprehension

7 Prototypical Applications

Source of rendering and documentation

```
#d2d module basic
  module inlineElements

    // ...

    tags nl = #empty
    docu to_xhtml_1_0 nl = "#br/"
    docu user_en nl = "Forces a line break, but not a new paragraph."
    docu user_de nl =
       #d2d Erzwingt Zeilenumbruch, aber #emph!keinen! Absatz.#/d2d

    // etc.

  end module
end module
```

Source of rendering and documentation

```
#d2d module basic
  module inlineElements

    // ...

    tags nl = #empty
    docu to_xhtml_1_0 nl = "#br/"
    docu user_en nl = "Forces a line break, but not a new paragraph."
    docu user_de nl =
       #d2d Erzwingt Zeilenumbruch, aber #emph!keinen! Absatz.#/d2d

    // etc.

  end module
end module
```

element declaration and content model

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#d2d module basic
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    // etc.

  end module
end module
```

element declaration and content model

rendering by XSLT
written as d2d
here: to XHTML 1.0

Source of rendering and documentation

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      #d2d Erzwingt Zeilenumbruch, aber #emph!keinen! Absatz.#/d2d

    // etc.

  end module
end module
```

element declaration and content model

rendering by XSLT written as d2d here: to XHTML 1.0

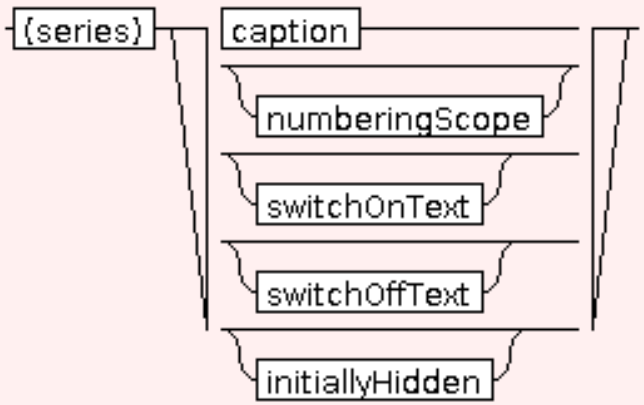
multi-lingual user documentation texts (as d2d)

Rendered Documentation, Navigable

TAGS parser `basic.floatings:` **`listOf`** via STR.FLOAT

Will be expanded to a list of the floating objects of a certain series.

Attention: The first tag is implicit, ie. may not appear in source text.




```
#implicit STR.FLOAT.series,
(STR.FLOAT.caption &
 STR.FLOAT.numberingScope? &
 STR.FLOAT.switchOnText? &
 STR.FLOAT.switchOffText? &
 STR.FLOAT.initiallyHidden?)
```

Used in : article -- webpage

Source is at SYSTEM "http://bandm.eu/doctypes/d2d_gp/basic.dd2":1878.5-1880.57. Xml tagging is `{http://bandm.eu/doctypes/d2d_gp/basic}a:listOf`

Rendered Documentation, Navigable

source text module name

d2d tag

path of imports

TAGS parser `basic.floatings:` **`listOf`** via STR.FLOAT

Will be expanded to a list of the floating objects of a certain series.

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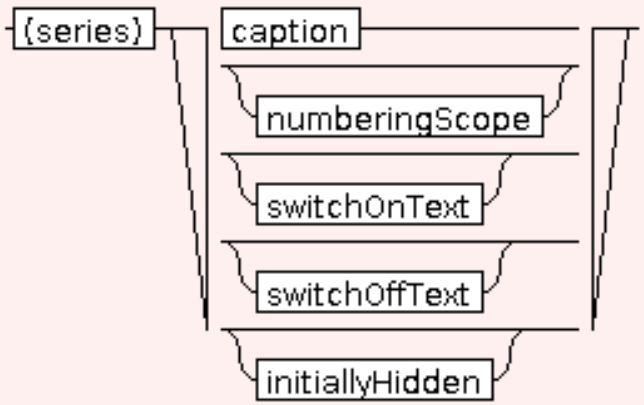


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#implicit STR.FLOAT.series,
(STR.FLOAT.caption &
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Rendered Documentation, Navigable

source text module name

d2d tag

path of imports

explicit doc text

automatic warning about inferred open tag

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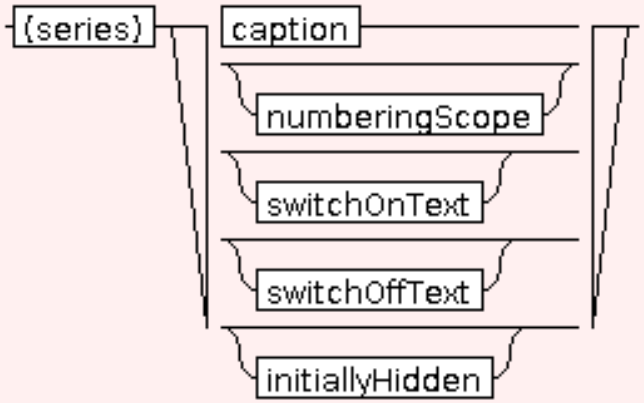



```
#implicit STR.FLOAT.series,
(STR.FLOAT.caption &
 STR.FLOAT.numberingScope? &
 STR.FLOAT.switchOnText? &
 STR.FLOAT.switchOffText? &
 STR.FLOAT.initiallyHidden?)
```

Used in : article -- webpage

Source is at SYSTEM "http://bandm.eu/doctypes/d2d_gp/basic.dd2":1878.5-1880.57. Xml tagging is `{http://bandm.eu/doctypes/d2d_gp/basic}a:listOf`

Rendered Documentation, Navigable

source text module name

d2d tag

TAGS parser `basic.floatings:` **`listOf`** via STR.FLOAT

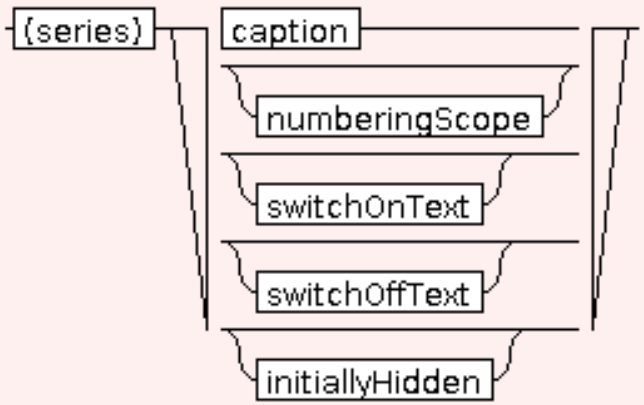
path of imports

Will be expanded to a list of the floating objects of a certain series.

explicit doc text

Attention: The first tag is implicit, ie. may not appear in source text.

automatic warning about inferred open tag



Wirth diagram (here: permutation operator)

source text (reconstructed)

```
#implicit STR.FLOAT.series,
(STR.FLOAT.caption &
 STR.FLOAT.numberingScope? &
 STR.FLOAT.switchOnText? &
 STR.FLOAT.switchOffText? &
 STR.FLOAT.initiallyHidden?)
```

Used in : article -- webpage

Source is at SYSTEM "http://bandm.eu/doctypes/d2d_gp/basic.dd2":1878.5-1880.57. Xml tagging is `{http://bandm.eu/doctypes/d2d_gp/basic}a:listOf`

Rendered Documentation, Navigable

TAGS parser `basic.floatings:` **`listOf`** via STR.FLOAT

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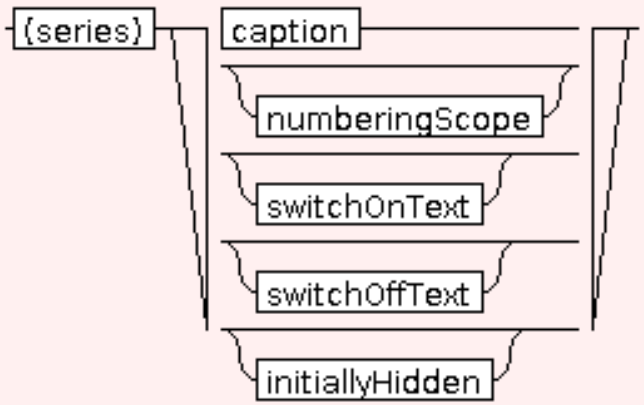


```
#implicit STR.FLOAT.series,
(STR.FLOAT.caption &
 STR.FLOAT.numberingScope? &
 STR.FLOAT.switchOnText? &
 STR.FLOAT.switchOffText? &
 STR.FLOAT.initiallyHidden?)
```

Used in : article -- webpage

Source is at SYSTEM "http://bandm.eu/doctypes/d2d_gp/basic.dd2":1878.5-1880.57. Xml tagging is `{http://bandm.eu/doctypes/d2d_gp/basic}a:listOf`

source text module name

d2d tag

path of imports

explicit doc text

automatic warning about inferred open tag

Wirth diagram (here: permutation operator)

source text (reconstructed)

referring elements

source file location

XML tag with namespace

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7 Prototypical Applications

<> Features and their Interactions:

- <> module parametrization by rewriting
- <> explicit tagging with minimal technical distraction
- <> robust parsing, synthesis of missing explicit tags
- <> implicit tagging by non-deterministic character parsing
- <> unification of attributes and element text content
- <> integration of multi-lingual documentation
- <> . . . and of subsequent processing by XSLT

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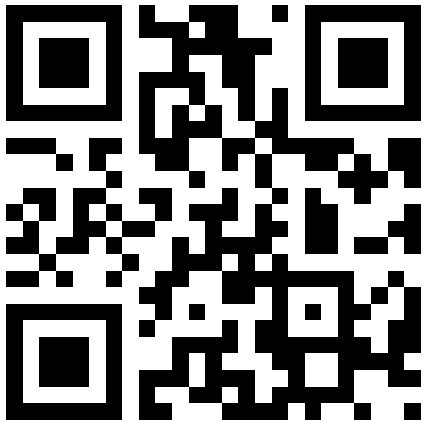
links



Survey page at `http://bandm.eu/d2d`
in English and German, with literature and examples.