

Ongoing efforts to generate “tagged PDF” using pdfT_EX

DML 2009 Workshop

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Sydney, Australia

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Outline

- 1 PDF standards
 - PDF/X, PDF/A, PDF/UA, etc.
 - What is a “tagged PDF”?
- 2 MathML tagging within a PDF
- 3 Where to from here?
 - The Team
 - References
 - Discussion Items

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- wikipedia ● ISO PDF (ISO 32000:1-2008); PDF 1.7
- wikipedia ● PDF/A (ISO 19005-1:2005); Archive, PDF/A-1a, PDF/A-1b
- wikipedia ● PDF/UA (ISO/AWI 14289); Universal Accessibility
- wikipedia ● PDF/E (ISO 24517-1:2008); Engineering, 3D drawings
- wikipedia ● PDF/X (ISO 15929:2002); eXchange & production printing
 - ISO 15930-1: PDF/X-1:2001, PDF/X-1a:2001;
CMYK + Spot Colors, based on PDF 1.3
 - ISO 15930-2: PDF/X-2 (not available online)
 - ISO 15930-3: PDF/X-3:2002; ICC profiles, PDF 1.3 based
 - ISO 15930-4: PDF/X-1a:2003; PDF 1.4 based
 - ISO 15930-5: PDF/X-2:2003; external links, PDF 1.4 based
 - ISO 15930-6: PDF/X-3:2003; PDF 1.4 based
 - ISO 15930-7: PDF/X-4:2008; PDF 1.6 based
& PDF/X-4p with external profiles

PDF/X, PDF/A, PDF/UA, etc.

- wikipedia ● ISO PDF (ISO 32000:1-2008); PDF 1.7
- wikipedia ● PDF/A (ISO 19005-1:2005); Archive, PDF/A-1a, PDF/A-1b
- wikipedia ● PDF/UA (ISO/AWI 14289); Universal Accessibility
- wikipedia ● PDF/E (ISO 24517-1:2008); Engineering, 3D drawings
- wikipedia ● PDF/X (ISO 15929:2002); eXchange & production printing
 - ISO 15930-1: PDF/X-1:2001, PDF/X-1a:2001;
CMYK + Spot Colors, based on PDF 1.3
 - ISO 15930-2: PDF/X-2 (not available online)
 - ISO 15930-3: PDF/X-3:2002; ICC profiles, PDF 1.3 based
 - ISO 15930-4: PDF/X-1a:2003; PDF 1.4 based
 - ISO 15930-5: PDF/X-2:2003; external links, PDF 1.4 based
 - ISO 15930-6: PDF/X-3:2003; PDF 1.4 based
 - ISO 15930-7: PDF/X-4:2008; PDF 1.6 based
& PDF/X-4p with external profiles

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PDF-to-Word Converter

PDF Word

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Completely Free!

Launch Now

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PDF Standards

Karl De Abrew CEO, Debenu

June 11, 2009

Editor's Note: Karl is the former CEO of Planet PDF. Today he specializes on the [Quick PDF Library](#) (formerly [iSEDQuickPDF](#)) and [Benubird Pro personal document management system](#).

Years ago when we used to talk about PDF as being the most prominent document format, we'd always have to add a quick, under-the-breath, "de-facto standard".

Yes, PDF was the document format most frequently chosen by system developers, enterprise specialists, print production gurus and all-

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...and there's more coming ...



- PDF/A-2 (2011 ?)
 - ISO 19005-2, based upon ISO 32000-1 (ISO PDF)
 - ISO 19005-3, dynamic media (movies, sounds, 3D, etc)
- PDF/X-5, ISO 15930-8; PDF 1.6 based — late 2008
- PDF/VT (Variable & Transactional Printing) ???
- PDF/UA, ISO 32000-2 (2011–2012)
 - 32000-math, MathML-2.0

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ISO PDF Specifications

tagged PDF

Tagged PDF (PDF 1.4) is a stylized use of PDF that builds on the logical structure framework described in §14.7, “Logical Structure.” It defines a set of standard structure types and attributes that allow page content (text, graphics, and images) to be extracted and reused for other purposes. A tagged PDF document is one that conforms to the rules [. . .]. A conforming writer is not required to produce tagged PDF documents; however, if it does, it shall conform to these rules. — PDF Reference 1.7, §14.8; 1.4, §9.7.

A tagged PDF document shall conform to the following rules:



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A tagged PDF document shall conform to the following rules:

- *Page content*: ... rules for representing text in the page content so that characters, words, and text order can be determined reliably. All text shall be represented in a form that can be converted to Unicode.
Word breaks shall be represented explicitly.
Actual content shall be distinguished from artifacts of layout and pagination. Content shall be given in an order related to its appearance on the page ...
- *A basic layout model*: ... rules for describing the arrangement of structure elements on the page.
- *Structure types*: ... define the meaning of structure elements, such as paragraphs, headings, articles, tables.
- *Structure attributes*: ... preserve styling information used ... in laying out content on the page.

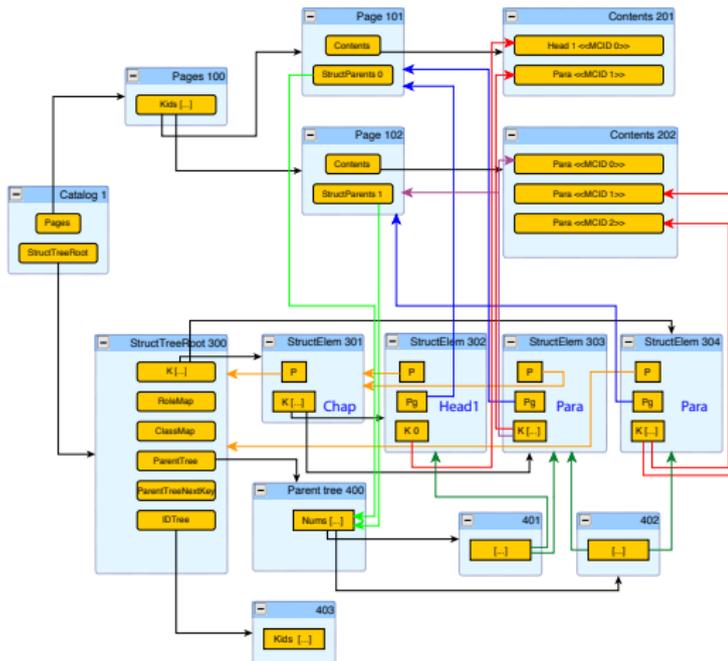


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- Demonstration #2.
Structure & content tagging in a PDF document.



... the complexity of this [diagram] can be viewed as the main reason why supporting “tagged PDF” hasn’t been attempted before [with T_EX]. That’s my opinion. Do you see it differently? — RRM, 11 May 2009.

*Yes “tagged PDF” is *\$&#! complex. Another reason is that the T_EX community doesn’t seem to need it — well, until the publishers start to make “tagged PDF” a requirement. — HTT, 11 May 2009.*

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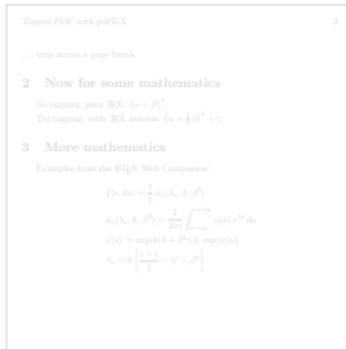
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- **Demonstration #4.**
Export to XML from Adobe Acrobat Pro.

Does any other software do this?



f3b.pdf (seen earlier)

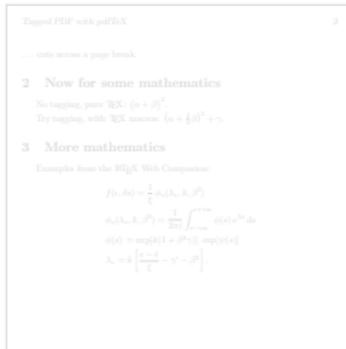


f8b.pdf (has more maths)

- **Demonstration #4.**
Export to XML from Adobe Acrobat Pro.
Does any other software do this?



f3b.pdf (seen earlier)

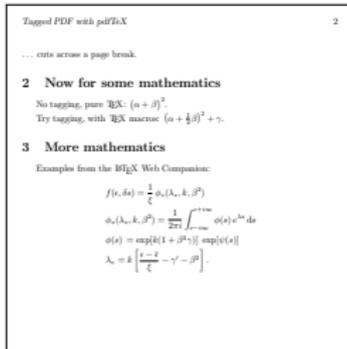


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f8b.pdf (has more maths)

new primitives

- for tagging content and building the structure tree:
`\pdfstartmarkedcontent [⟨attr spec⟩] ⟨parent id⟩ ⟨tag name⟩`
`\pdfendmarkedcontent`
`\pdfstructelem [⟨attr spec⟩] ⟨parentid⟩ ⟨id⟩`
- for tagging with **/Alt** , **/ActualText** , **/Artifact**
`\pdfstartmarkedcontent [⟨attr spec⟩] -1 ⟨tag name⟩`
- when tagged content extends across a page boundary:
`\pdfendpagestream` and `\pdfstartpagestream`
- adding attributes to **/StructTreeRoot** ; e.g.,
`\pdfstructreeroot {/RoleMap << /Para /P /Head /H1 >>}`

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quotes from Hàn Thế Thành



We should not rely solely on macros but should provide a few commands to ease the process. The question now is to figure out what commands we really need.

— HTT, 1 Apr 2009

... it would be good to get more people involved, since the hardest part of this is on the macro side. Once the low-level primitives are working as expected, my part is over.

— HTT, 11 May 2009

I know you want to give credits to my part ... However ... in fact the most hardest [sic.] work is in the macro programming part.

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use of the new primitives with mathematics

Demonstration #5.

```
Typerset  LaTeX  Macros  Tags  Templates
%<math display="block">\int_0^1 x^2 dx = \frac{1}{3} x^3 \Big|_0^1 = \frac{1}{3} (1^3 - 0^3) = \frac{1}{3}\frac{d}{dx} x^2 = 2x\frac{d}{dx} \sin(x) = \cos(x)\frac{d}{dx} \cos(x) = -\sin(x)\frac{d}{dx} e^x = e^x\frac{d}{dx} \ln(x) = \frac{1}{x}\frac{d}{dx} a^x = a^x \ln(a)\frac{d}{dx} x^a = a x^{a-1}\frac{d}{dx} x^2 = 2x\frac{d}{dx} x^3 = 3x^2\frac{d}{dx} x^4 = 4x^3\frac{d}{dx} x^5 = 5x^4\frac{d}{dx} x^6 = 6x^5\frac{d}{dx} x^7 = 7x^6\frac{d}{dx} x^8 = 8x^7\frac{d}{dx} x^9 = 9x^8\frac{d}{dx} x^{10} = 10x^9\frac{d}{dx} x^{11} = 11x^{10}\frac{d}{dx} x^{12} = 12x^{11}\frac{d}{dx} x^{13} = 13x^{12}\frac{d}{dx} x^{14} = 14x^{13}\frac{d}{dx} x^{15} = 15x^{14}\frac{d}{dx} x^{16} = 16x^{15}\frac{d}{dx} x^{17} = 17x^{16}\frac{d}{dx} x^{18} = 18x^{17}\frac{d}{dx} x^{19} = 19x^{18}\frac{d}{dx} x^{20} = 20x^{19}\frac{d}{dx} x^{21} = 21x^{20}\frac{d}{dx} x^{22} = 22x^{21}\frac{d}{dx} x^{23} = 23x^{22}\frac{d}{dx} x^{24} = 24x^{23}\frac{d}{dx} x^{25} = 25x^{24}\frac{d}{dx} x^{26} = 26x^{25}\frac{d}{dx} x^{27} = 27x^{26}\frac{d}{dx} x^{28} = 28x^{27}\frac{d}{dx} x^{29} = 29x^{28}\frac{d}{dx} x^{30} = 30x^{29}\frac{d}{dx} x^{31} = 31x^{30}\frac{d}{dx} x^{32} = 32x^{31}\frac{d}{dx} x^{33} = 33x^{32}\frac{d}{dx} x^{34} = 34x^{33}\frac{d}{dx} x^{35} = 35x^{34}\frac{d}{dx} x^{36} = 36x^{35}\frac{d}{dx} x^{37} = 37x^{36}\frac{d}{dx} x^{38} = 38x^{37}\frac{d}{dx} x^{39} = 39x^{38}\frac{d}{dx} x^{40} = 40x^{39}\frac{d}{dx} x^{41} = 41x^{40}\frac{d}{dx} x^{42} = 42x^{41}\frac{d}{dx} x^{43} = 43x^{42}\frac{d}{dx} x^{44} = 44x^{43}\frac{d}{dx} x^{45} = 45x^{44}\frac{d}{dx} x^{46} = 46x^{45}\frac{d}{dx} x^{47} = 47x^{46}\frac{d}{dx} x^{48} = 48x^{47}\frac{d}{dx} x^{49} = 49x^{48}\frac{d}{dx} x^{50} = 50x^{49}\frac{d}{dx} x^{51} = 51x^{50}\frac{d}{dx} x^{52} = 52x^{51}\frac{d}{dx} x^{53} = 53x^{52}\frac{d}{dx} x^{54} = 54x^{53}\frac{d}{dx} x^{55} = 55x^{54}\frac{d}{dx} x^{56} = 56x^{55}\frac{d}{dx} x^{57} = 57x^{56}\frac{d}{dx} x^{58} = 58x^{57}\frac{d}{dx} x^{59} = 59x^{58}\frac{d}{dx} x^{60} = 60x^{59}\frac{d}{dx} x^{61} = 61x^{60}\frac{d}{dx} x^{62} = 62x^{61}\frac{d}{dx} x^{63} = 63x^{62}\frac{d}{dx} x^{64} = 64x^{63}\frac{d}{dx} x^{65} = 65x^{64}\frac{d}{dx} x^{66} = 66x^{65}\frac{d}{dx} x^{67} = 67x^{66}\frac{d}{dx} x^{68} = 68x^{67}\frac{d}{dx} x^{69} = 69x^{68}\frac{d}{dx} x^{70} = 70x^{69}\frac{d}{dx} x^{71} = 71x^{70}\frac{d}{dx} x^{72} = 72x^{71}\frac{d}{dx} x^{73} = 73x^{72}\frac{d}{dx} x^{74} = 74x^{73}\frac{d}{dx} x^{75} = 75x^{74}\frac{d}{dx} x^{76} = 76x^{75}\frac{d}{dx} x^{77} = 77x^{76}\frac{d}{dx} x^{78} = 78x^{77}\frac{d}{dx} x^{79} = 79x^{78}\frac{d}{dx} x^{80} = 80x^{79}\frac{d}{dx} x^{81} = 81x^{80}\frac{d}{dx} x^{82} = 82x^{81}\frac{d}{dx} x^{83} = 83x^{82}\frac{d}{dx} x^{84} = 84x^{83}\frac{d}{dx} x^{85} = 85x^{84}\frac{d}{dx} x^{86} = 86x^{85}\frac{d}{dx} x^{87} = 87x^{86}\frac{d}{dx} x^{88} = 88x^{87}\frac{d}{dx} x^{89} = 89x^{88}\frac{d}{dx} x^{90} = 90x^{89}\frac{d}{dx} x^{91} = 91x^{90}\frac{d}{dx} x^{92} = 92x^{91}\frac{d}{dx} x^{93} = 93x^{92}\frac{d}{dx} x^{94} = 94x^{93}\frac{d}{dx} x^{95} = 95x^{94}\frac{d}{dx} x^{96} = 96x^{95}\frac{d}{dx} x^{97} = 97x^{96}\frac{d}{dx} x^{98} = 98x^{97}\frac{d}{dx} x^{99} = 99x^{98}\frac{d}{dx} x^{100} = 100x^{99}
```

primitives only

Demonstration #6.

```
Typerset  LaTeX  Macros  Tags  Templates
%<math display="block">\int_0^1 x^2 dx = \frac{1}{3} x^3 \Big|_0^1 = \frac{1}{3} (1^3 - 0^3) = \frac{1}{3}\frac{d}{dx} x^2 = 2x\frac{d}{dx} \sin(x) = \cos(x)\frac{d}{dx} \cos(x) = -\sin(x)\frac{d}{dx} e^x = e^x\frac{d}{dx} \ln(x) = \frac{1}{x}\frac{d}{dx} a^x = a^x \ln(a)\frac{d}{dx} x^a = a x^{a-1}\frac{d}{dx} x^2 = 2x\frac{d}{dx} x^3 = 3x^2\frac{d}{dx} x^4 = 4x^3\frac{d}{dx} x^5 = 5x^4\frac{d}{dx} x^6 = 6x^5\frac{d}{dx} x^7 = 7x^6\frac{d}{dx} x^8 = 8x^7\frac{d}{dx} x^9 = 9x^8\frac{d}{dx} x^{10} = 10x^9\frac{d}{dx} x^{11} = 11x^{10}\frac{d}{dx} x^{12} = 12x^{11}\frac{d}{dx} x^{13} = 13x^{12}\frac{d}{dx} x^{14} = 14x^{13}\frac{d}{dx} x^{15} = 15x^{14}\frac{d}{dx} x^{16} = 16x^{15}\frac{d}{dx} x^{17} = 17x^{16}\frac{d}{dx} x^{18} = 18x^{17}\frac{d}{dx} x^{19} = 19x^{18}\frac{d}{dx} x^{20} = 20x^{19}\frac{d}{dx} x^{21} = 21x^{20}\frac{d}{dx} x^{22} = 22x^{21}\frac{d}{dx} x^{23} = 23x^{22}\frac{d}{dx} x^{24} = 24x^{23}\frac{d}{dx} x^{25} = 25x^{24}\frac{d}{dx} x^{26} = 26x^{25}\frac{d}{dx} x^{27} = 27x^{26}\frac{d}{dx} x^{28} = 28x^{27}\frac{d}{dx} x^{29} = 29x^{28}\frac{d}{dx} x^{30} = 30x^{29}\frac{d}{dx} x^{31} = 31x^{30}\frac{d}{dx} x^{32} = 32x^{31}\frac{d}{dx} x^{33} = 33x^{32}\frac{d}{dx} x^{34} = 34x^{33}\frac{d}{dx} x^{35} = 35x^{34}\frac{d}{dx} x^{36} = 36x^{35}\frac{d}{dx} x^{37} = 37x^{36}\frac{d}{dx} x^{38} = 38x^{37}\frac{d}{dx} x^{39} = 39x^{38}\frac{d}{dx} x^{40} = 40x^{39}\frac{d}{dx} x^{41} = 41x^{40}\frac{d}{dx} x^{42} = 42x^{41}\frac{d}{dx} x^{43} = 43x^{42}\frac{d}{dx} x^{44} = 44x^{43}\frac{d}{dx} x^{45} = 45x^{44}\frac{d}{dx} x^{46} = 46x^{45}\frac{d}{dx} x^{47} = 47x^{46}\frac{d}{dx} x^{48} = 48x^{47}\frac{d}{dx} x^{49} = 49x^{48}\frac{d}{dx} x^{50} = 50x^{49}\frac{d}{dx} x^{51} = 51x^{50}\frac{d}{dx} x^{52} = 52x^{51}\frac{d}{dx} x^{53} = 53x^{52}\frac{d}{dx} x^{54} = 54x^{53}\frac{d}{dx} x^{55} = 55x^{54}\frac{d}{dx} x^{56} = 56x^{55}\frac{d}{dx} x^{57} = 57x^{56}\frac{d}{dx} x^{58} = 58x^{57}\frac{d}{dx} x^{59} = 59x^{58}\frac{d}{dx} x^{60} = 60x^{59}\frac{d}{dx} x^{61} = 61x^{60}\frac{d}{dx} x^{62} = 62x^{61}\frac{d}{dx} x^{63} = 63x^{62}\frac{d}{dx} x^{64} = 64x^{63}\frac{d}{dx} x^{65} = 65x^{64}\frac{d}{dx} x^{66} = 66x^{65}\frac{d}{dx} x^{67} = 67x^{66}\frac{d}{dx} x^{68} = 68x^{67}\frac{d}{dx} x^{69} = 69x^{68}\frac{d}{dx} x^{70} = 70x^{69}\frac{d}{dx} x^{71} = 71x^{70}\frac{d}{dx} x^{72} = 72x^{71}\frac{d}{dx} x^{73} = 73x^{72}\frac{d}{dx} x^{74} = 74x^{73}\frac{d}{dx} x^{75} = 75x^{74}\frac{d}{dx} x^{76} = 76x^{75}\frac{d}{dx} x^{77} = 77x^{76}\frac{d}{dx} x^{78} = 78x^{77}\frac{d}{dx} x^{79} = 79x^{78}\frac{d}{dx} x^{80} = 80x^{79}\frac{d}{dx} x^{81} = 81x^{80}\frac{d}{dx} x^{82} = 82x^{81}\frac{d}{dx} x^{83} = 83x^{82}\frac{d}{dx} x^{84} = 84x^{83}\frac{d}{dx} x^{85} = 85x^{84}\frac{d}{dx} x^{86} = 86x^{85}\frac{d}{dx} x^{87} = 87x^{86}\frac{d}{dx} x^{88} = 88x^{87}\frac{d}{dx} x^{89} = 89x^{88}\frac{d}{dx} x^{90} = 90x^{89}\frac{d}{dx} x^{91} = 91x^{90}\frac{d}{dx} x^{92} = 92x^{91}\frac{d}{dx} x^{93} = 93x^{92}\frac{d}{dx} x^{94} = 94x^{93}\frac{d}{dx} x^{95} = 95x^{94}\frac{d}{dx} x^{96} = 96x^{95}\frac{d}{dx} x^{97} = 97x^{96}\frac{d}{dx} x^{98} = 98x^{97}\frac{d}{dx} x^{99} = 99x^{98}\frac{d}{dx} x^{100} = 100x^{99}
```

using L^AT_EX macros



MACQUARIE UNIVERSITY

- generating MathML from \LaTeX environments.
- merge the MathML with the \LaTeX source from which it was generated.
- extend the support for tagging to other \LaTeX environments; (see Google Summer-of-Coding proposal).
- call for participation to help code these tasks.
... expected time-frame: 2–3 years, depending upon available coders and/or funding.

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Outline

- 1 PDF standards
 - PDF/X, PDF/A, PDF/UA, etc.
 - What is a “tagged PDF”?
- 2 MathML tagging within a PDF
- 3 Where to from here?
 - The Team
 - References
 - Discussion Items

The Team

Programmers:

- Hàn Thế Thành: River Valley Technologies (Germany)
pdf \TeX programming, new primitives etc., mailing list.
- Ross Moore: Macquarie University, Sydney, Australia
 \TeX and \LaTeX programming, mathematics, etc.
- Neil Soiffer: Design Science (USA)
MathPlayer software developer, liaison with Adobe Inc.

Observers: (via the email list)

- CV Radhakrishnan: River Valley Technologies (India)
- Karl Berry: President, \TeX Users Group (TUG)
- arthur.reutenauer, fabio.giulitti, martin, mbana.lists, pault,
vgaburici, trewin

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PDF/UA Universal Accessibility; websites at <http://pdf.editme.com/pdfua> and

<http://www.aiim.org/Standards/article.aspx?ID=27861>

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