Automated PDF Testing

Carsten Siedentop, PDFUnit.com

PDFUnit
Automated PDF Tests

Carsten Siedentop
PDFUnit.com

In the next 45 minutes

- Why tests?
- What to test?
- How to test – PDFUnit's Syntax
- Testing Visible Contents
- Testing Invisible Contents
- PDFUnit-Monitor
- PDFUnit in .NET, Perl, XML

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- PDFUnit in .NET, Perl, XML

With many code examples

PDFUnit
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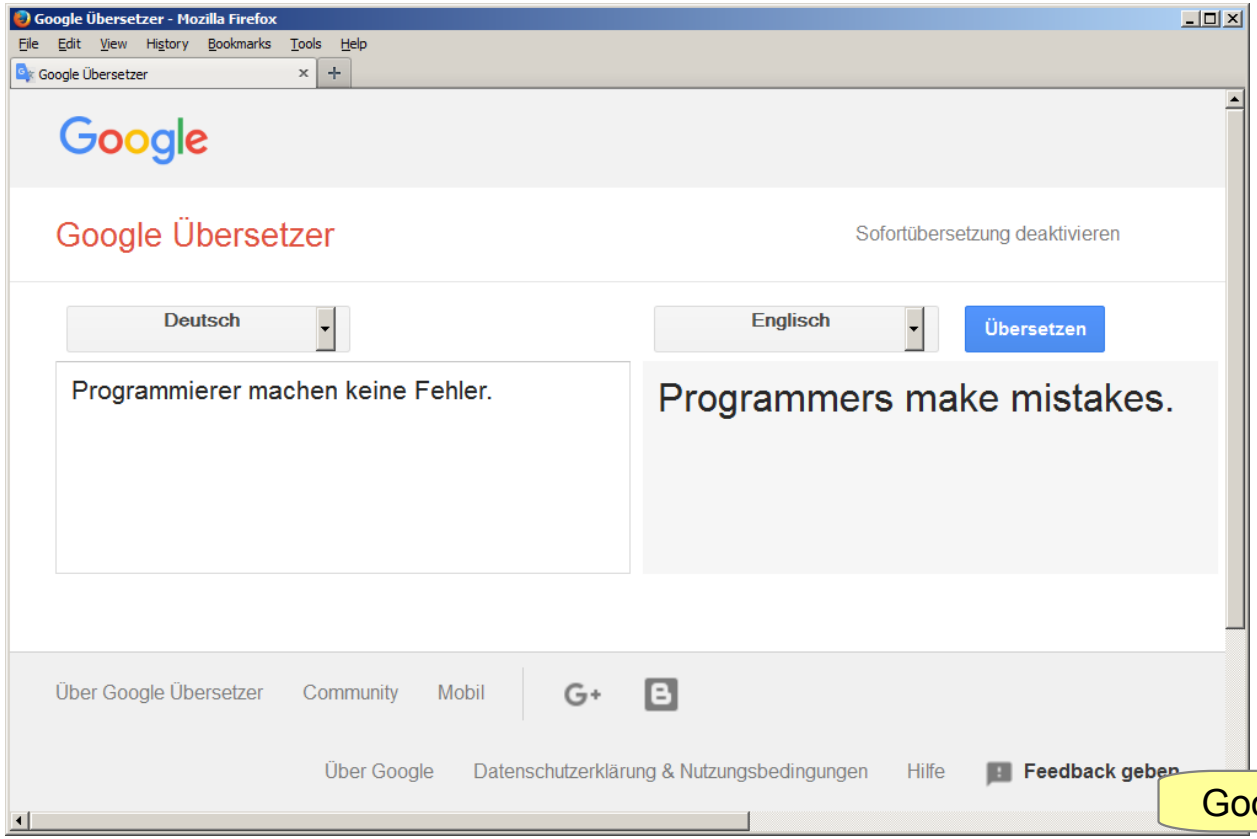
Why tests?

- A PDF is the result of many business processes
- Faulty PDF documents are bad for business
- A PDF generating software contains errors

Why tests? Programmers make mistakes!



Google is right!

Why tests?

- A PDF is the result of many business processes
- Faulty PDF documents are bad for business
- A PDF generating software contains errors

- Programmers make mistakes
- Programs will change
- Computing environment will change

Why tests?

- A PDF is the result of many business processes
- Faulty PDF documents are bad for business
- A PDF generating software contains errors

Testing is expensive

- Programmers make mistakes
- Programs will change
- Computing environment will change

Why tests?

- A PDF is the result of many business processes
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Testing is expensive

- Programmers make mistakes
- Programs will change
- Computing environment will change

Not testing is more expensive

Why automated tests? (1/2)

- Disadvantages of manual testing:
  - limited human resources
  - results not always reproducible
  - expensive
- Disadvantages of automated testing:
  - It takes time to know the tools

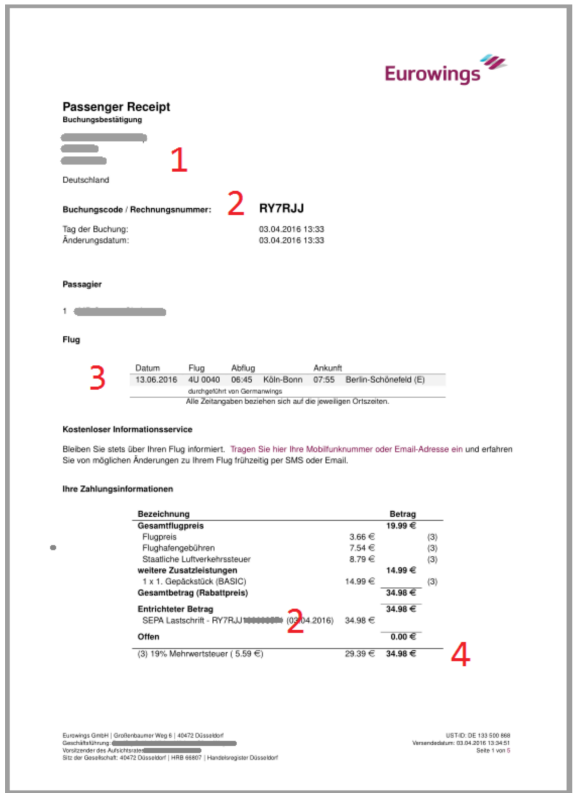
Why automated tests? (2/2)

- Advantages of automated testing:
  - no human resources needed
  - directly runnable
  - runnable at any time
  - available for many years
  - inexpensive

Does everybody agree?

What to test?

What to test? Some examples:



How to test? PDFUnit's Syntax

PDFUnit's Syntax – Single Document

- Dear IT-Jim,

  please assert that the document has the new logo.
  Best regards, Business-Bill

The way you speak

PDFUnit's Syntax – Single Document

- Dear IT-Jim,

  please assert that the document has the new logo.
  Best regards, Business-Bill

The way you speak

PDFUnit's Syntax – Single Document

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The way you speak

PDFUnit's Syntax – Single Document

- Dear IT-Jim,

  assert that document has new logo.

  Best regards, Business-Bill

The way you speak

The way PFUnit speaks

- AssertThat.document("document.pdf")
  .hasImage()
  .matching("newLogo.png")

PDFUnit's Syntax – Multiple Documents

- Dear IT-Jim,

  please assert that each document in the folder has the new logo.
  Best regards, Business-Bill

More than one document

PDFUnit's Syntax – Multiple Documents

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  please assert that each document in the folder has the new logo.
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More than one document

PDFUnit's Syntax – Multiple Documents

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PDFUnit's Syntax – Multiple Documents

- Dear IT-Jim,

  assert that each document in folder has new logo.

  Best regards, Business-Bill

- AssertThat.eachDocument()
  .inFolder(..)
  .hasImage()
  .matching("newLogo.png")

Example 101

PDFUnit's Syntax – Comparing Two Documents

- Dear IT-Jim,

  please assert that the PDF under test and the reference PDF have the same number of pages.
  Best regards, Business-Bill

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PDFUnit's Syntax – Comparing Two Documents

- Dear IT-Jim,

  assert that PDF under test and reference PDF have same number of pages.
  Best regards, Business-Bill

- AssertThat.document(pdfUnderTest)
  .and(referencePDF)
  .haveSameNumberOfPages()

Example 102

Page Selection – Using Constants

- AssertThat.document(..)
  .restrictedTo(FIRST_PAGE)
  .hasText()

- Predefined Constants:
  - FIRST_PAGE
  - LAST_PAGE
  - EVERY_PAGE
  - ANY_PAGE
  - EVEN_PAGES
  - ODD_PAGES

Page Selection – Individual Pages and Page Ranges

- ... .restrictedTo(page3)
  ... .restrictedTo(pages123)
  ... .restrictedTo(pages1To3)

- page3 = PagesToUse.getPage(3);
  pages123 = PagesToUse.getPages(1, 2, 3);
  pages1To3 = PagesToUse.spanningFrom(1).to(3);

All requirements are covered

Page Regions

- ... .restrictedTo(bodyRegion)
  ... .restrictedTo(addressRegion)

- int leftX = 18;
  int upperY = 30;
  int w = 182;
  int h = 238;
  bodyRegion = new PageRegion(leftX, upperY, w, h);

- addressRegion = new PageRegion(..);

x=0, y=0 is the upper left corner

The First Example

```
public void hasTextSpanningOver2Pages() {
  String filename = "document-under-test.pdf";
  String textOnPage1 = "Text starts  on page 1 and ";
  String textOnPage2 = "continues on page 2";
  String expectedText = textOnPage1 + textOnPage2;
  PagesToUse pages1to2 = PagesToUse.spanningFrom(1).to(2);

  int leftX  =  18;
  int upperY =  30;
  int width  = 182;
  int height = 238;
  PageRegion bodyRegion = new PageRegion(leftX, upperY, width, height);

  AssertThat.document(filename)
            .restrictedTo(pages1to2)
            .restrictedTo(bodyRegion)
            .hasText()
            .containing(expectedText)
  ;
}
```

Example 103

Testing Visible Contents

Testing Visible Contents

- Text in pages and page regions — Example 201
- Ordered text — Example 202
- Rendered pages, rendered regions — Example 203
- Images — Example 204
- Form fields — Example 205
- Bookmarks — Example 206
- Bar code, QR code — Example 207
- Text in images (OCR) — Example 208
- Right-to-left text — Example 209

Skip examples

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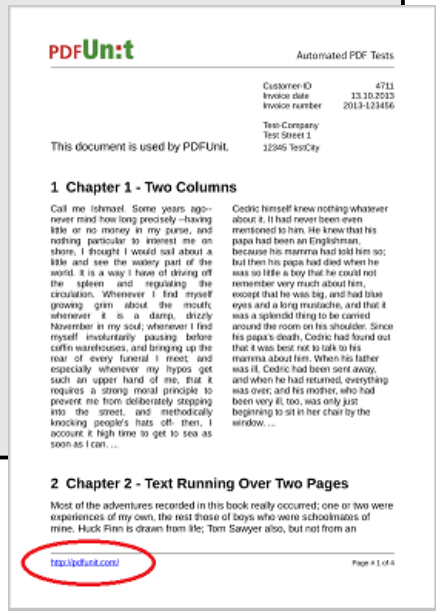
PDFUnit.com

Example – Text in Page Regions

```
@Test
public void hasLinkInFooterAfterPage1() {
  String pdfUnderTest = "document-under-test.pdf";
  String linkToHomepage = "http://pdfunit.com/";
  PagesToUse pagesAfter1 = ON_EVERY_PAGE.after(1);
  PageRegion footerRegion = createFooterRegion();

  AssertThat.document(pdfUnderTest)
            .restrictedTo(pagesAfter1)
            .restrictedTo(footerRegion)
            .hasText()
            .containing(linkToHomepage)
  ;
}
```

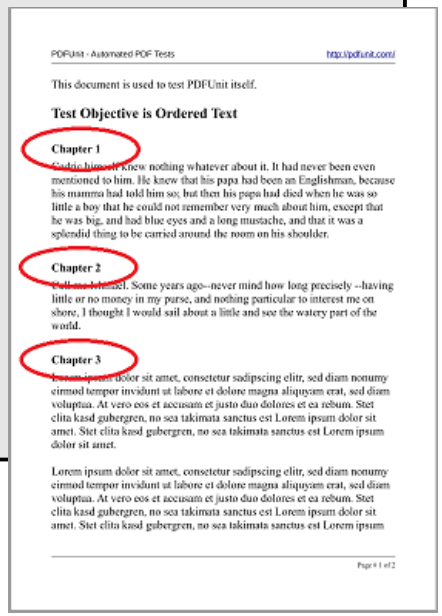

PDFUn:t
Automated PDF Tests
This document is used by PDFUnit.
1 Chapter 1 - Two Columns
2 Chapter 2 - Text Running Over Two Pages
http://pdfunit.com/

⇧ overview
Example 201

Example – Ordered Text

```
@Test
public void hasTextInOrder() {
  String pdfUnderTest = "document-under-test.pdf";
  String titleChapter1 = "Chapter 1";
  String titleChapter2 = "Chapter 2";
  String titleChapter3 = "Chapter 3";

  AssertThat.document(pdfUnderTest)
            .hasText()
            .first(titleChapter1)
            .then(titleChapter2)
            .then(titleChapter3)
  ;
}
```


PDFUnit - Automated PDF Tests http://pdfunit.com/

This document is used to test PDFUnit itself.

Test Objective is Ordered Text

Chapter 1

Cedric himself knew nothing whatever about it. It had never been even mentioned to him. He knew that his papa had been an Englishman, because his mamma had told him so; but then his papa had died when he was so little a boy that he could not remember very much about him, except that he was big, and had blue eyes and a long mustache, and that it was a splendid thing to be carried around the room on his shoulder.

Chapter 2

Call me Ishmael. Some years ago--never mind how long precisely --having little or no money in my purse, and nothing particular to interest me on shore, I thought I would sail about a little and see the watery part of the world.

Chapter 3

Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod tempor invidunt ut labore et dolore magna aliquyam erat, sed diam voluptua. At vero eos et accusam et justo duo dolores et ea rebum. Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet. Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet.

Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod tempor invidunt ut labore et dolore magna aliquyam erat, sed diam voluptua. At vero eos et accusam et justo duo dolores et ea rebum. Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet. Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum

⇧ overview
Example 202

Example – Compare Rendered Pages

```
@Test
public void haveSameAppearanceInRegion() {
  String pdfUnderTest = "document-under-test.pdf";
  String pdfReference = "reference.pdf";

  int leftX  =   0; // millimeters
  int upperY =   0;
  int width  = 210;
  int height =  50;
  PageRegion pageRegion = new PageRegion(leftX, upperY, width, height);

  AssertThat.document(pdfUnderTest)
            .and(pdfReference)
            .restrictedTo(EVERY_PAGE)
            .restrictedTo(pageRegion)
            .haveSameAppearance()
  ;
}
```

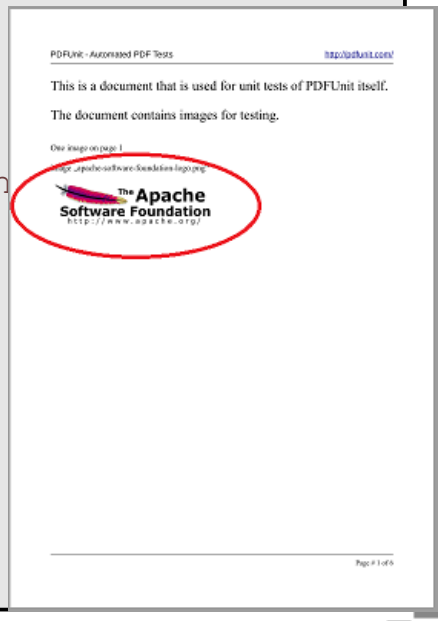
⇧ overview
Example 203

Example – Check Images

```
@Test
public void hasImageInRegion() {
  String pdfUnderTest = "document-under-test.pdf";
  String logoASF = "images/apache-software-foundation-logo.png";

  int leftX  =  15; // millimeters
  int upperY =  80;
  int w      = 150;
  int h      =  45;
  PageRegion logoRegion = new PageRegion(leftX, upperY, w, h
  PagesToUse page3 = PagesToUse.getPages(3);

  AssertThat.document(pdfUnderTest)
            .restrictedTo(page3)
            .restrictedTo(logoRegion)
            .hasImage()
            .matching(logoASF)
  ;
}
```

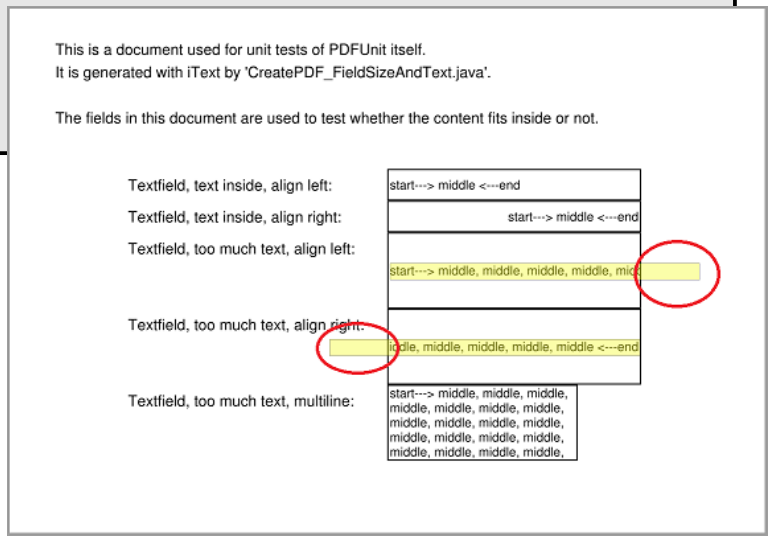


⇧ overview
Example 204

Example – Form Fields

```
@Test
public void allFieldsWithoutTextOverflow() {
  String pdfUnderTest = "document-under-test.pdf";

  AssertThat.document(pdfUnderTest)
            .hasFields()
            .allWithoutTextOverflow()
  ;
}
```

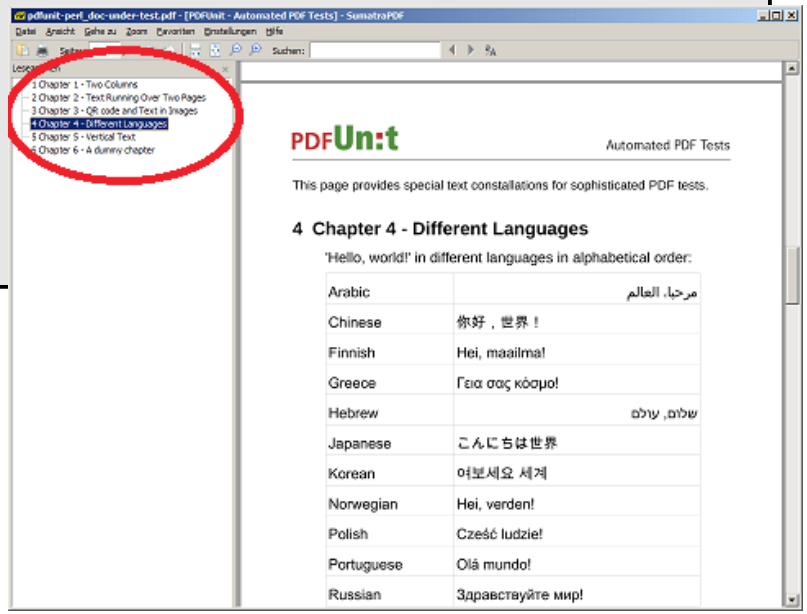


⇧ overview
Example 205

Example – Bookmarks

```
@Test
public void hasBookmarkWithLabel() {
  String pdfUnderTest = "document-under-test.pdf";
  String bookmarkChapter4 = "4 Chapter 4 - Different Languages";

  AssertThat.document(pdfUnderTest)
            .hasBookmark()
            .withLabel(bookmarkChapter4)
  ;
}
```



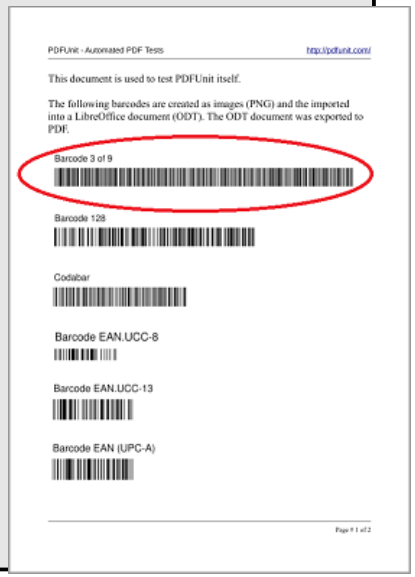
⇧ overview
Example 206

Example – Bar Code, QR Code

```
@Test
public void hasBarCode_3of9() {
  String pdfUnderTest = "document-under-test.pdf";

  int leftX  =   0; // millimeters
  int upperY =  70;
  int w      = 210;
  int h      =  30;
  PageRegion pageRegion = new PageRegion(leftX, upperY, w, h);

  AssertThat.document(pdfUnderTest)
            .restrictedTo(FIRST_PAGE)
            .restrictedTo(pageRegion)
            .hasImage()
            .withBarcode()
            .containing("TESTING BARCODES WITH PDFUNIT")
  ;
}
```



⇧ overview
Example 207

Example – Text in Images (OCR)

```
@Test
public void validateTextInImages() {
  String pdfUnderTest = "document-under-test.pdf";
  String expectedText = "S4NM3G";
  PagesToUse page2 = PagesToUse.getPage(2);
  PageRegion imageRegion = createOCRImageRegion();

  AssertThat.document(pdfUnderTest)
            .restrictedTo(page2)
            .restrictedTo(imageRegion)
            .hasImage()
            .withText()
            .equalsTo(expectedText)
  ;
}
```

This is a PNG image:

⇧ overview
Example 208

Example – RTL Text (right-to-left)

```
@Test
public void validateRightToLeftText() {
  String pdfUnderTest = "document-under-test.pdf";
  String hello_ar = "مرحبا، العالم";
  String hello_cn = "你好，世界！";
  String hello_he = "שלום, עולם";
  String hello_ru = "Здравствуйте мир!";
  PagesToUse page3 = PagesToUse.getPage(3);

  AssertThat.document(pdfUnderTest)
            .restrictedTo(page3)
            .hasText()
            .containing(hello_ar)
            .containing(hello_cn)
            .containing(hello_he)
            .containing(hello_ru)
    ;
  }
```

4 Chapter 4 - Different Languages

'Hello, world!' in different languages in alphabetical order:

Arabic	مرحبا، العالم
Chinese	你好，世界！
Hebrew	שלום, עולם
Russian	Здравствуйте мир!

⇧ overview
Example 209

Testing Invisible Contents

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Testing Invisible Contents

- Hidden text — Example 301
- Empty regions — Example 302
- Field properties — Example 303
- Contents of ZUGFeRD data — Example 304
- Compliance with PDF/A-1 — Example 305
- Compliance with design rules — Example 306
- Signature data (signed by, ...) — Example 307
- Fonts — Example 308
- JavaScript — Example 309

Skip examples

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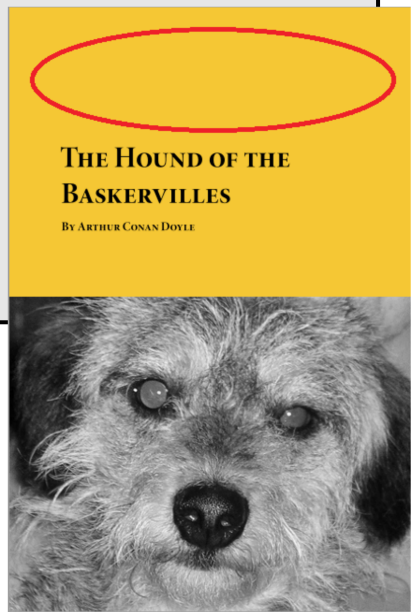
Example – Hidden Text

```
@Test
public void checkInvisibleText() {
  String pdfUnderTest = "the-hound-of-baskervilles.pdf";
  String expectedText = "Download free eBooks of classic";

  AssertThat.document(pdfUnderTest)
            .restrictedTo(FIRST_PAGE)
            .hasText()
            .startingWith(expectedText)
  ;
}
```

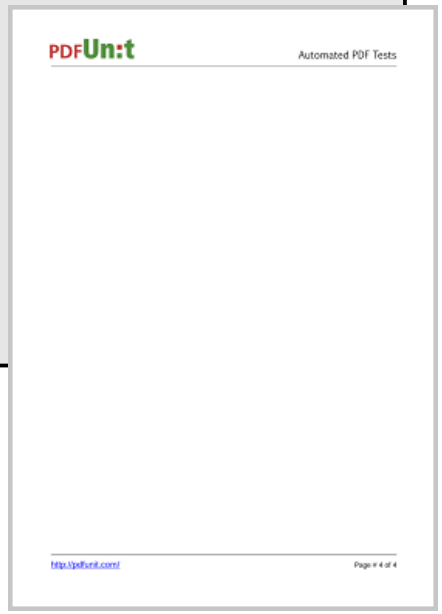


⇧ overview
Example 301

Example – Empty Regions

```
@Test
public void lastPageBodyShouldBeEmpty() {
  String pdfUnderTest = "document-under-test.pdf";
  PageRegion textBody = createBodyRegion();

  AssertThat.document(pdfUnderTest)
            .restrictedTo(LAST_PAGE)
            .restrictedTo(textBody)
            .hasNoImage()
            .hasNoText()
  ;
}
```

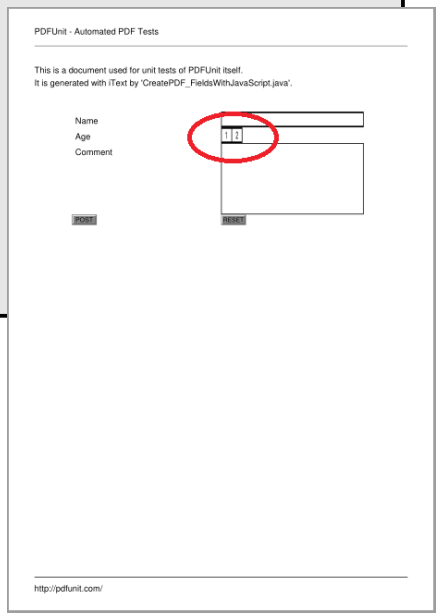


⇧ overview
Example 302

Example – Form Field Properties

```
@Test
public void hasField_Exportable() throws Exception {
  String pdfUnderTest = "document-under-test.pdf";
  String fieldnameExportableField = "ageField";

  AssertThat.document(filename)
            .hasField(fieldnameExportableField)
            .withProperty()
            .exportable()
  ;
}
```

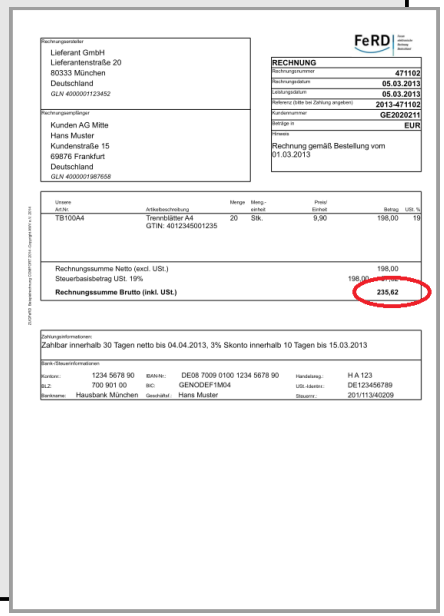


⇧ overview
Example 303

Example – Contents in ZUGFeRD data

```
public void validateTotalSum() {
  String pdfUnderTest = "ZUGFeRD_1p0_BASIC_Einfach.pdf";
  String expectedTotalXML = "235.62";
  String expectedTotalPDF = "235,62";
  XMLNode nodeTotal = new XMLNode("ram:GrandTotalAmount", expectedTotalXML);
  PageRegion regionTotal = createRegionTotal();

  AssertThat.document(pdfUnderTest)
            .hasZugferdData()
            .withNode(nodeTotal)
  ;
  AssertThat.document(pdfUnderTest)
            .restrictedTo(FIRST_PAGE)
            .restrictedTo(regionTotal)
            .hasText()
            .containing(expectedTotalPDF)
  ;
}
```

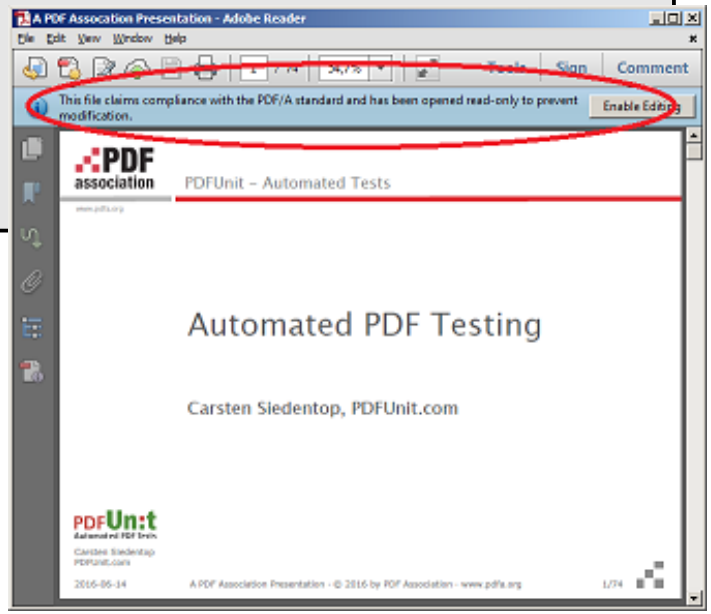


⇧ overview
Example 304

Example – Compliance with PDF/A-1a

```
@Test
public void compliesWithPDFA() {
  String pdfUnderTest = "document-under-test.pdf";

  AssertThat.document(pdfUnderTest)
            .compliesWith()
            .pdfStandard(Standard.PDFA_1A)
  ;
}
```

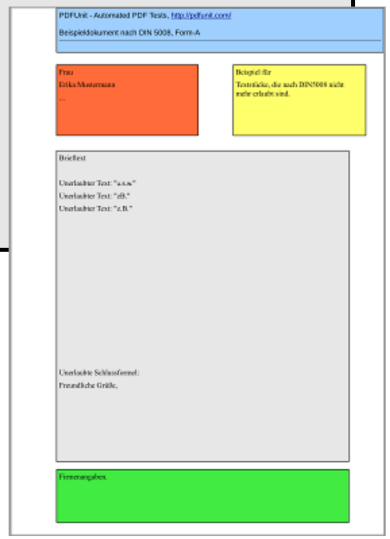


⇧ overview
Example 305

Example – Compliance with Company Rules

```
@Test
public void letterCompliesWithDIN5008() {
  String pdfUnderTest = "document-under-test.pdf";
  String rules5008 = "din5008-formA_brief-hochkant.xls";
  PDFValidationConstraints constr = new PDFValidationConstraints(rules5008);

  AssertThat.document(pdfUnderTest)
            .compliesWith()
            .constraints(constr)
  ;
}
```

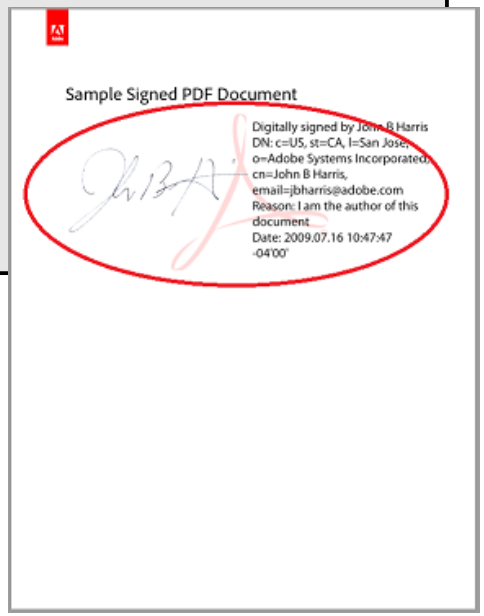


⇧ overview
Example 306

Example – Signature Data

```
@Test
public void checkSigningDate() {
  String pdfUnderTest = "document-under-test.pdf";
  Calendar signingDate = DateHelper.getCalendar("2007-10-14", "yyyy-MM-dd");

  AssertThat.document(pdfUnderTest)
            .hasSignatureField("sign_rbl")
            .signedOn(signingDate)
  ;
}
```

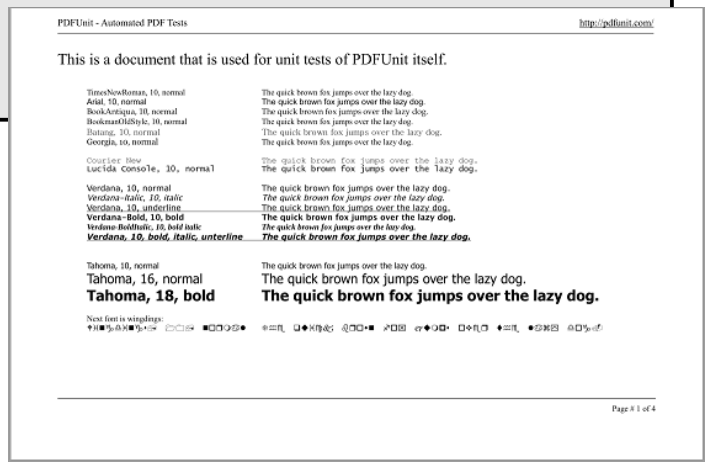


⇧ overview
Example 307

Example – Fonts

```
@Test
public void shouldNotHaveFont_ComicSansMS() {
  String pdfUnderTest = "document-under-test.pdf";
  String fontComic = "ComicSansMS";

  AssertThat.document(pdfUnderTest)
            .hasFont()
            .withNameNotContaining(fontComic)
  ;
}
```


PDFUnit - Automated PDF Tests http://pdfunit.com/

This is a document that is used for unit tests of PDFUnit itself.

TimesNewRoman, 10, normal — The quick brown fox jumps over the lazy dog.
Arial, 10, normal — The quick brown fox jumps over the lazy dog.
BookAntiqua, 10, normal — The quick brown fox jumps over the lazy dog.
BookmanOldStyle, 10, normal — The quick brown fox jumps over the lazy dog.
Batang, 10, normal — The quick brown fox jumps over the lazy dog.
Georgia, 10, normal — The quick brown fox jumps over the lazy dog.

Courier New — The quick brown fox jumps over the lazy dog.
Lucida Console, 10, normal — The quick brown fox jumps over the lazy dog.

Verdana, 10, normal — The quick brown fox jumps over the lazy dog.
Verdana-Italic, 10, italic — The quick brown fox jumps over the lazy dog.
Verdana, 10, underline — The quick brown fox jumps over the lazy dog.
Verdana-Bold, 10, bold — The quick brown fox jumps over the lazy dog.
Verdana-BoldItalic, 10, bold italic — The quick brown fox jumps over the lazy dog.
Verdana, 10, bold, italic, unterline — The quick brown fox jumps over the lazy dog.

Tahoma, 10, normal — The quick brown fox jumps over the lazy dog.
Tahoma, 16, normal — The quick brown fox jumps over the lazy dog.
Tahoma, 18, bold — The quick brown fox jumps over the lazy dog.

Next font is wingdings:

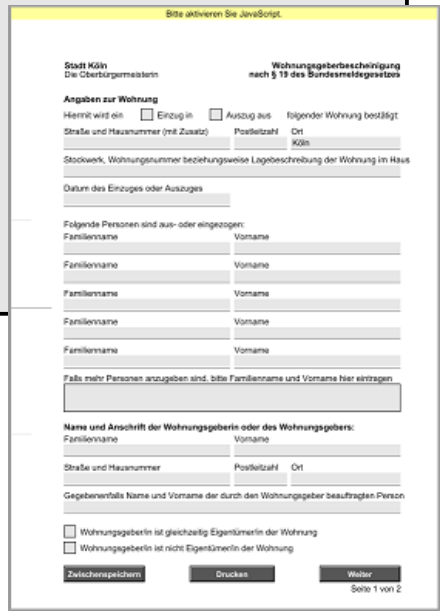
Page 1 of 4

⇧ overview
Example 308

Example – JavaScript

```
@Test
public void hasJavaScript_DateFunctions() {
  String pdfUnderTest = "document-under-test.pdf";

  AssertThat.document(pdfUnderTest)
            .hasJavaScript()
            .containing("function DataClassTime")
            .containing("function DataClassTime_Format")
            .containing("function DataClassTime_Scan")
  ;
}
```



⇧ overview
Example 309

PDFUnit-Monitor

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Automated PDF Tests

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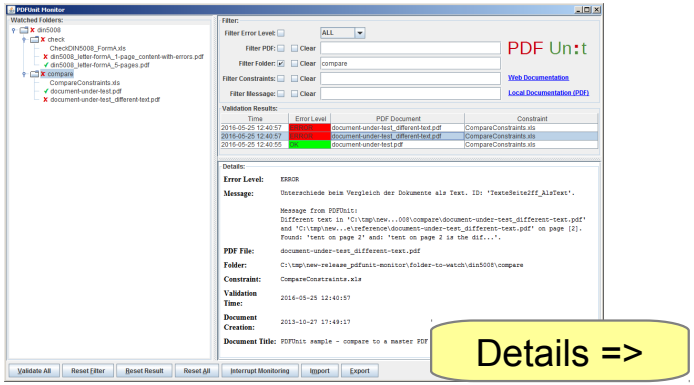
PDFUnit.com

PDFUnit-Monitor

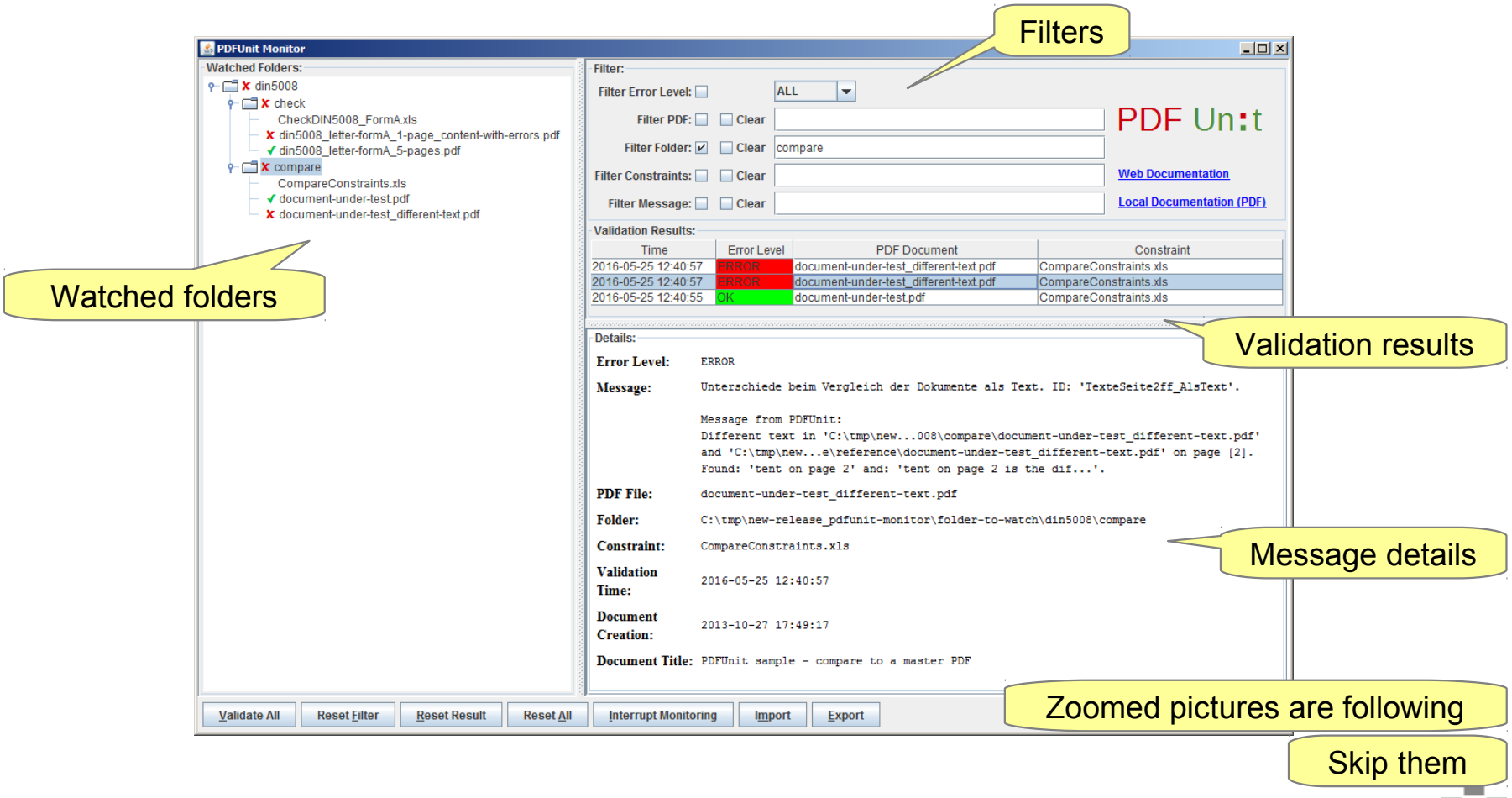
- Continuously watching PDF in folders
- Suitable for non-programmers
- Validation rules are put in Excel files
- Also for interactive usage



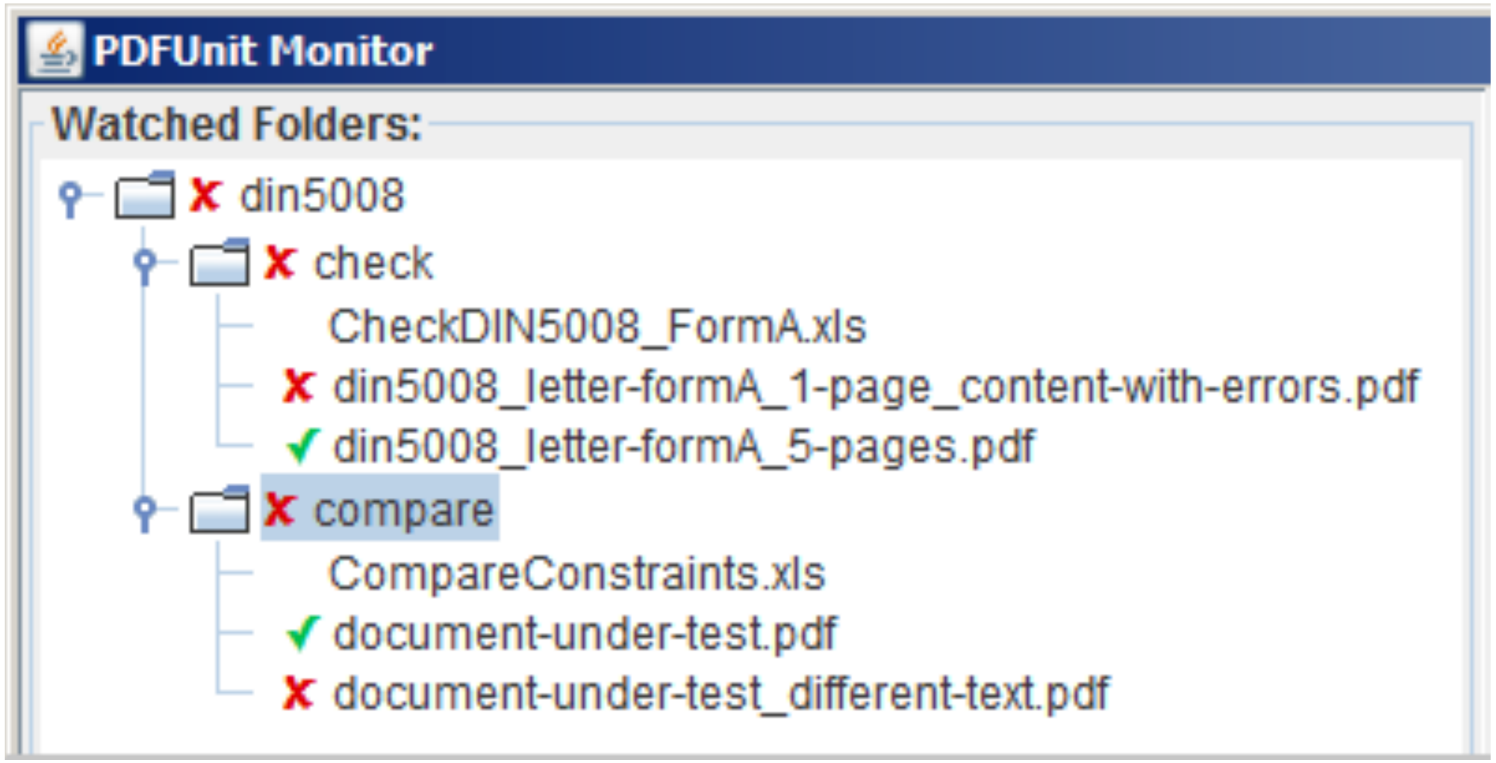
PDFUn:t
Automated PDF Tests

Carsten Siedentop
PDFUnit.com

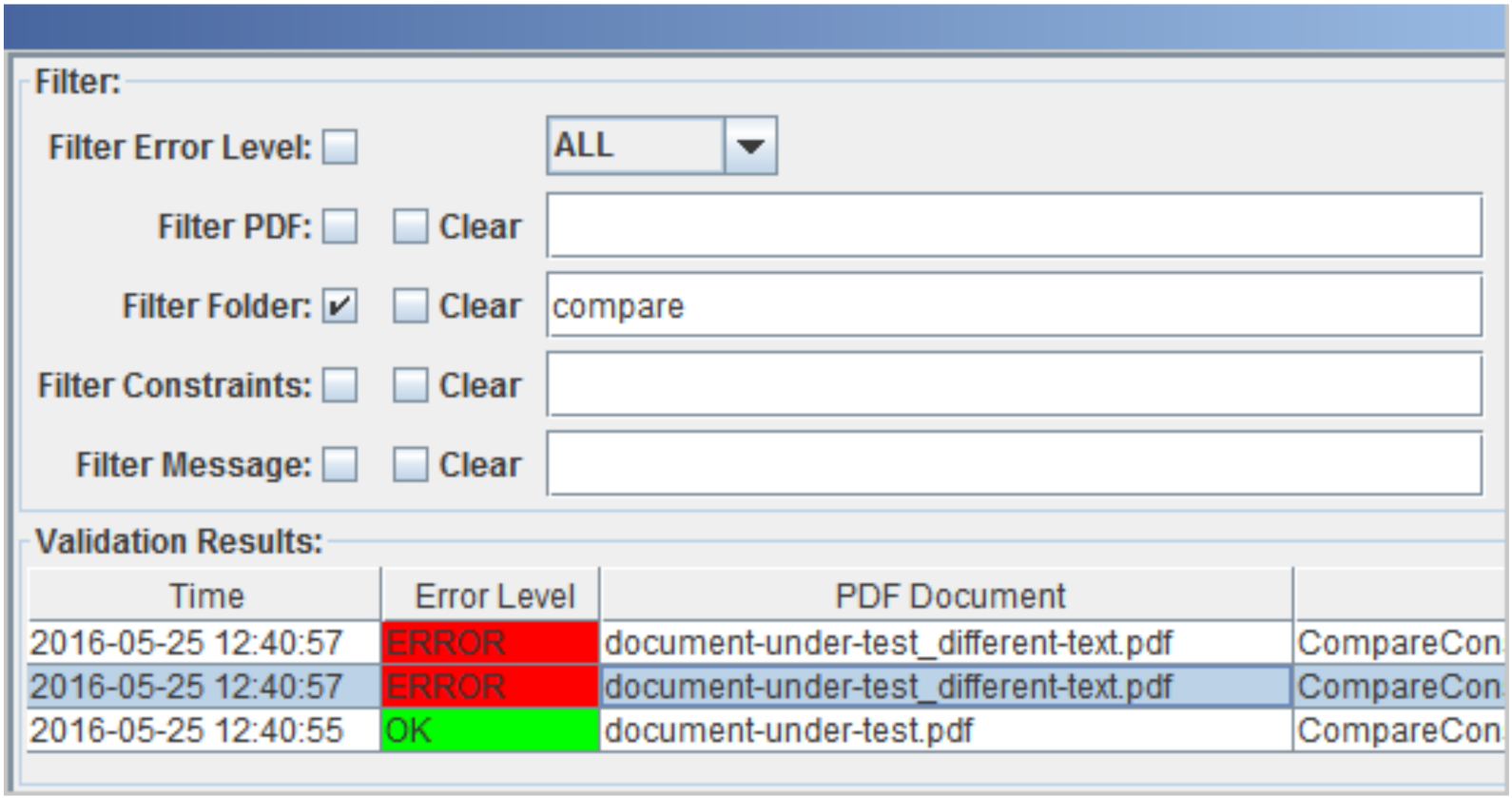
PDFUnit-Monitor – Continuously Monitoring



PDFUnit-Monitor – Watched Folders



PDFUnit-Monitor – Result List and Message Filters



PDFUnit-Monitor – Message Details

Details:

Error Level:	ERROR
Message:	Unterschiede beim Vergleich der Dokumente als Text. ID: 'TexteSeite2ff_AlsText'. Message from PDFUnit: Different text in 'C:\tmp\new...008\compare\document-under-test_different-text.pdf' and 'C:\tmp\new...e\reference\document-under-test_different-text.pdf' on page [2]. Found: 'tent on page 2' and: 'tent on page 2 is the dif...'.
PDF File:	document-under-test_different-text.pdf
Folder:	C:\tmp\new-release_pdfunit-monitor\folder-to-watch\din5008\compare
Constraint:	CompareConstraints.xls
Validation Time:	2016-05-25 12:40:57
Document Creation:	2013-10-27 17:49:17
Document Title:	PDFUnit sample - compare to a master PDF

Application and messages in English and German

Programming Languages

PDFUnit is available for:

- Java — Example 401
- .NET — Example 402
- Perl — Example 403
- XML — Example 404

PDFUnit
Automated PDF Tests

Skip examples

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PDFUnit.com

Example in Java

```
@Test
public void haveSameAppearanceInRegion() throws Exception {
  String pdfUnderTest = "document-under-test.pdf";
  String pdfReference = "reference.pdf";

  int leftX  =   0; // millimeters
  int upperY =   0;
  int width  = 210;
  int height =  50;
  PageRegion pageRegion = new PageRegion(leftX, upperY, width, height);

  AssertThat.document(pdfUnderTest)
            .and(pdfReference)
            .restrictedTo(EVERY_PAGE)
            .restrictedTo(pageRegion)
            .haveSameAppearance()
  ;
}
```

⇧ overview
Example 401

Example in .NET, C#

```
[TestMethod]
public void haveSameAppearanceInRegion() {
  String pdfUnderTest = "document-under-test.pdf";
  String pdfReference = "reference.pdf";

  int leftX  =   0;
  int upperY =   0;
  int weidht = 210;
  int height =  50;
  PageRegion region = new PageRegion(leftX, upperY, width, height);

  AssertThat.document(pdfUnderTest)
            .and(pdfReference)
            .restrictedTo(Constants.EVERY_PAGE)
            .restrictedTo(region)
            .haveSameAppearance()
  ;
}
```

⇧ overview
Example 402

Example in Perl

```
lives_ok {
  my $pdfUnderTest = "document-under-test.pdf";
  my $pdfReference = "reference.pdf";

  my $leftX  =   0;
  my $upperY =   0;
  my $width  = 210;
  my $height =  50;
  my $region = PageRegion->new($leftX, $upperY, $width, $height);

  AssertThat->document($pdfUnderTest)
            ->and($pdfReference)
            ->restrictedTo(EVERY_PAGE)
            ->restrictedTo($region)
            ->haveSameAppearance()
  ;
} "haveSameAppearanceInRegion";
```

⇧ overview

Example 403

Perl-Wrapper by Axel Miesen, http://search.cpan.org/dist/PDF-PDFUnit/

Example in XML

```
<testcase name="haveSameAppearanceInRegion">
  <assertThat pdfUnderTest="document-under-test.pdf"
              pdfReference="reference.pdf"
  >
    <haveSameAppearance on="EVERY_PAGE">
      <inRegion upperLeftX="0"
                upperLeftY="0"
                width="210"
                height="50"
      />
    </haveSameAppearance>
  </assertThat>
</testcase>
```

⇧ overview

Example 404

Conclusion

PDFUnit – Conclusion

- Programmers make mistakes (you remember)
- One mistake is not to test

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PDFUnit – Conclusion

- Programmers make mistakes (you remember)
- One mistake is not to test
- Another mistake is to accept the situation

PDFUnit – Conclusion

- Programmers make mistakes (you remember)
- One mistake is not to test
- Another mistake is to accept the situation

- The management has to support the decision to invest in automated tests.

Sometimes managers make mistakes (ask Google)

Skip management errors

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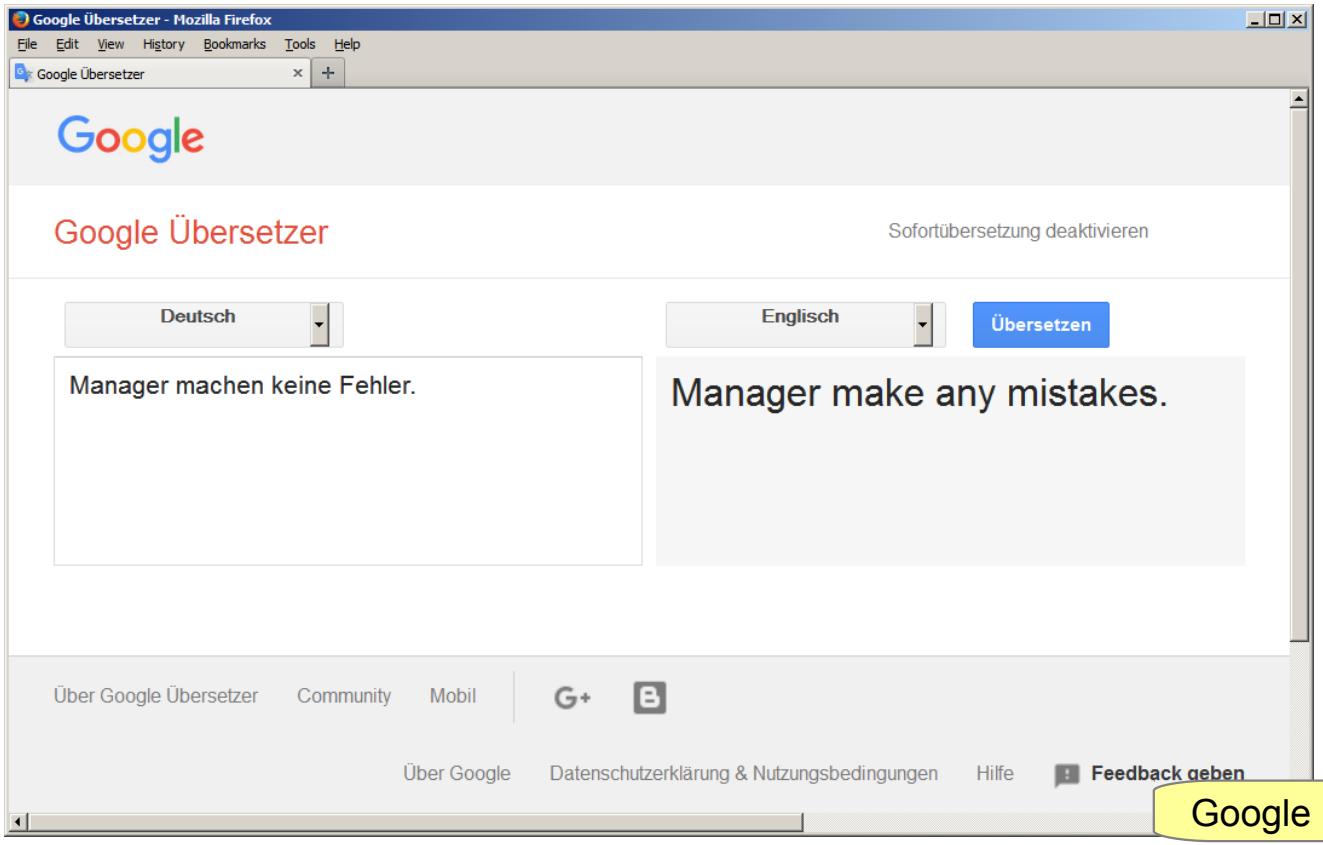
Managers ...



Google knows it!

PDFUnit Automated PDF Tests

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Testing PDF with PDFUnit is easy

Thank you! Any questions?

PDFUnit Automated PDF Tests

Get in touch: c.siedentop@pdfunit.com

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Additional Slides

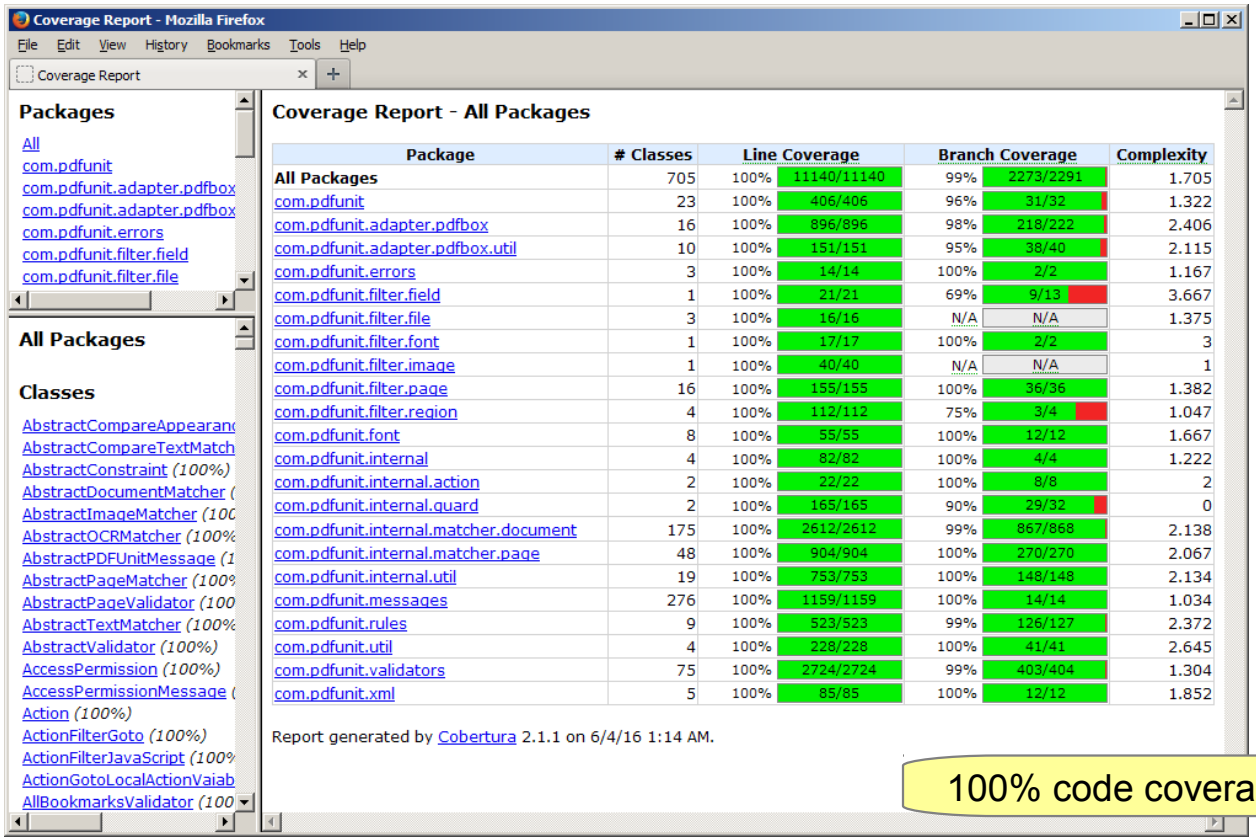
Additional Slides

- Challenging Tests
- PDFUnit is well tested
- PDFUnit is well documented
- PDFUnit at runtime

Challenging Test Scenarios

- Create a PDF,
  send it by email,
  and validate the received attachment — Example 501
- Create a PDF by a Web application,
  validate the downloaded PDF — Example 502
- Compare ZUGFeRD content
  with visible PDF data — Example 503

PDFUnit is well tested



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PDFUnit is well documented

- User manual in English and German
- User manuals 150+ pages
- Same documentation online as HTML
- Many index terms as links, also in PDF
- Javadoc as HTML online and as ZIP for download
- XML-Schema documentation as HTML

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PDFUnit at Runtime

- Continuously watching incoming PDF:
  - ZUGFeRD data are as expected — Example 601
  - No JavaScript in PDF documents — Example 602
  - Signature exists — Example 603
  - ...