Documentation Generators

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March 3, 2013

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Documentation Generators

. . . because everyone *loves* writing documentation.

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1 Source Code (API) Documentation

Source Code Documentation

- For as long as people have been writing source code, they've been looking for ways to ease the effort of documenting that code.
  - Often after-the-fact
- Earliest examples were automatic flowchart generators

  Generating flowcharts from source code.
  - Raw results were poor quality
    - But still could be claimed to satisfy client requirements
  - As flowchars declined inpopularity, so did the demenad for these tools.
  - Still offered in reverse engineering tools (e.g.
    - Flowchart synced to code viewer
    - Human retitles blocks as "understanding" of the code progresses

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API Documentation

API documentation tools are now more common

- Reflect modern emphasis on re-usable interfaces
- Combine info from
  - a (limited) language parser
    extracts info about module/function structure and function parameters
  - and specially formatted blocks of comments embedded in the source code
    encourages updating comments as code is modified
- Generate linked documents to facilitate browsing of referenced type names and other entities
- Some IDEs understand this markup as well and use it enhance “live” help while editing code.

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1.1 javadoc

javadoc

Perhaps the best known tool in this category

- part of the standard Java distribution
- achieved prominence when Sun used it to document the Java “standard library”.
  - E.g., 1.6, 1.7

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Javadoc Comments

- Javadoc markup is enclosed in comments delineated by `/**...*/`
  - And therefore processed as normal comments by the Java compiler.
- A comment block precedes the entity that it describes
  - e.g., This page is generated from

```
/**
 *
 */
package edu.odu.cs.extract.control;

import org.jdom.Document;

import edu.odu.cs.extract.dataflow.Dataflow;
import edu.odu.cs.extract.dataflow.QuickTransformer;
import edu.odu.cs.extract.dataflow.TransformationResult;
import edu.odu.cs.extract.inputprocessing.segmentation.Segmentation;
import edu.odu.cs.extract.utils.Properties;

/**
 * Transforms a PDF file dataflow into Raw IDM by attempting a direct translation
 * of text PDF, but passing pages thought to be scanned on for OCR and thenby trimming t
 * OCR-to-rawIDM conversion.
 *
 * @author zeil
```


```
 *
 */
public class SegmentationTransformer extends QuickTransformer {


    /**
     *
     */
    public SegmentationTransformer() {
     super();
    }

    /* (non-Javadoc)
     * @see edu.odu.cs.extract.dataflow.ThreadedTransformer#doTransform(edu.odu.cs.extra
     */
    @Override
    public TransformationResult doTransform(Dataflow[] in) throws Exception {
     String status = "success";
     String message = "OK";

     IDMDataflow inputDF = (IDMDataflow) in[0];
     Document unsegmentedIDM = inputDF.getDocument();
     String mergeFailed = unsegmentedIDM.getRootElement().getAttributeValue("OCRmerge");

     if (mergeFailed != null && "failed".equals(mergeFailed)) {
     status = "warning";
     message = "unable to merge pages from OCR";
```


```
    }

    // Segment document
    Document segmentedIDM = new Segmentation(unsegmentedIDM).reSegment();

    IDMDataflow outputDF = new IDMDataflow (in[0].getTrace(), segmentedIDM);

/*
    File idmOutput = null;
    Properties p = Properties.getProperties();
    File ocrOutDir;
    if (p.getPropertyAsBoolean(Properties.Names.DEBUG_MODE))
    ocrOutDir = p.getPropertyAsFile(Properties.Names.DEBUG_DIR);
    else
    ocrOutDir = p.getPropertyAsFile(Properties.Names.TEMP_DIR);
    if (p.getPropertyAsBoolean(Properties.Names.SEGMENTATION_ARCHIVING)) {
    String idmExtension = p.getProperty(Properties.Names.SEGMENTATION_OUT_EXT);
    idmOutput = new File (ocrOutDir,
    inputDF.getTrace().getName() + idmExtension);

    new IDMProxy(segmentedIDM).saveAs(idmOutput);
    }
*/
    return new TransformationResult(outputDF,status, message, null);
   }

   @Override
```


```
    public String getOutputExtension() {
     Properties p = Properties.getProperties();
     return p.getProperty(Properties.Names.SEGMENTATION_OUT_EXT);
    }



}
```

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- In addition to “free-form” text, can contain special markup

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Common Javadoc Markup

- @author *authorName*
- @version *versionNumber*
- @param *name description*
- @return *description*
- @throws *exceptionClassName description*
- @see *crossReference*

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Running javadoc

- Command line

```
javadoc -d destinationDir -sourcepath sourceCodeDir \
    -link http://docs.oracle.com/javase/7/docs/api/
```

  - Can add multiple source paths, links to external libraries
  - Can also specify which packages from source code to document

- Eclipse: `Project⇒Generate Javadoc...`

- ant

```
<javadoc packagenames="edu.odu.cs.*"
         destdir="target/javadoc"
         classpathref="javadoc.classpath" Author="yes"
         Version="yes" Use="yes" defaultexcludes="yes">
   <fileset dir="." defaultexcludes="yes">
      <include name="extractor/src/main/java/**" />
      <include name="generatedSource/gen-src/**" />
      <exclude name="**/*.html" />
   </fileset>
   <doctitle><![CDATA[<h1>ODU CS Extract
                    Project</h1>]]></doctitle>
</javadoc>
```


1.2 doxygen

doxygen

- the most popular API generator for C/C++
  - Also works with Objective-C, C#, Java, IDL, Python, PHP, VHDL, and FORTRAN
- Markup is essentially identical to **javadoc**
- Output can be HTML, LaTeX, or RTF
- Can also generate
  - various non-quite-UML diagrams
  - and hyperlinked source code

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Running doxygen

- Command line

  doxygen *configFile*

  The config file can contain any of a bewildering set of options in typical property-file style:

```
PROJECT_NAME = C++ Spreadsheet
INPUT = src/model
OUTPUT_DIRECTORY = target/doc
EXTRACT_ALL = YES
```


```
CLASS_DIAGRAMS = YES
GENERATE_HTML = YES
GENERATE_LATEX = YES
USE_PDFLATEX = YES
```

- Eclipse: Eclox plugin
- Ant (3rd-party contributed task)

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1.3 Other Tools

Other API Documentation Generators

The need to parse module and function structure and function parameters means that a distinct parser is needed for each programming language.

This leads to a variety of tools, e.g.,

- jsDoc for Javascript
- YARD for Ruby
- sandcastle for .Net

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2 Project Reports

Test Reports

We've already looked JUnit, which can be used to generate test reports like this one.
This is generated in ant via the `junitreport` task:

```
<project name="code2html" basedir="." default="build">

  <record name="ant.log" action="start" append="false" />

  <taskdef classpath="JFlex.jar" classname="JFlex.anttask.JFlexTask" name="jflex" />

  <echo>loading build-${os.name}.paths</echo>
  <include file="build-${os.name}.paths"/>


  <target name="generateSource">
    <mkdir dir="src/main/java"/>
    <jflex file="src/main/jflex/code2html.flex"
       destdir="src/main/java"/>
    <jflex file="src/main/jflex/code2tex.flex"
           destdir="src/main/java"/>
    <jflex file="src/main/jflex/list2html.flex"
       destdir="src/main/java"/>
    <jflex file="src/main/jflex/list2tex.flex"
           destdir="src/main/java"/>
  </target>


  <target name="compile" depends="generateSource">
    <mkdir dir="target/classes"/>
```


```
  <javac srcdir="src/main/java" destdir="target/classes"
     source="1.6" includeantruntime="false"/>
</target>

<target name="compile-tests" depends="compile">
  <mkdir dir="target/test-classes"/>
  <javac srcdir="src/test/java" destdir="target/test-classes"
     source="1.6" includeantruntime="false">
    <classpath refid="testCompilationPath"/>
  </javac>
</target>

<target name="test" depends="compile-tests">
  <property name="mypath" refid="testExecutionPath"/>
  <echo>testExecutioPath is ${mypath}</echo>
  <echoproperties/>
  <mkdir dir="target/test-results/details"/>
  <junit printsummary="yes"
     haltonfailure="yes" fork="no"
     >
      <classpath refid="testExecutionPath"/>
    <formatter type="xml"/>
    <batchtest todir="target/test-results/details">
       <fileset dir="target/test-classes">
          <include name="**/*Test*.class"/>
       </fileset>
    </batchtest>
```


```
    </junit>
    <junitreport todir="target/test-results">
      <fileset dir="target/test-results/details">
        <include name="TEST-*.xml"/>
      </fileset>
      <report format="frames" todir="target/test-results/html"/>
    </junitreport>
  </target>

  <target name="build"  depends="test">
    <jar destfile="codeAnnotation.jar" basedir="target/classes">
        <manifest>
         <attribute name="Main-Class"
                    value="edu.odu.cs.code2html.Code2HTML"/>
    </manifest>
    </jar>
  </target>

  <target name="clean">
    <delete dir="target"/>
  </target>


</project>
```

Other common test reports

- Javadoc of unit test code

- Coverage reports

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Static Code Analyzers

Many tools that we will cover later for analyzing code can produce useful (or at least, impressive) documentation as a side effect.

- Example

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Configuration Reports

Configuration managers (to be covered later) generate reports about the dependencies among the software components.

Examples:

- Maven
- Ivy

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3 Project Websites

Project Websites

- Traditionally hand-constructed

  - Or “grown” (Wikis)

- Some build managers will generate websites linking together reports
  - Example

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Forges

A *software forge* is a collection of web services for the support of collaborative software devlopment:

- Project web sites
- Networked access to version control
  - Release (download) support
- Communications (e.g., messaging, wikis, announcements)
- Bug reporting and tracking
- Project personnel management

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Forge Examples

Among the best known forges are

- the original, SourceForge, (1999)
- Google Code, (2006)

- GitHub, (2008)

The CS Dept currently runs its own installation of

- Fusion Forge
  - forked from GForge
    - forked from SourceForge