Analyzing Software Licenses in Open Architecture Software Systems

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More and more systems...

- ... are composed of components from many sources
- ... under a variety of licenses (some of which may conflict)
- ... and evolving by component replacement not development
Unity Software

- Integrates multiple third party libraries
  - The Mono Class Library, Copyright © 2005 - 2008 Novell, Inc.
  - The Mono Runtime Libraries, Copyright © 2005 - 2008 Novell, Inc.
  - Boo, Copyright © 2003 - 2008 Rodrigo B. Oliveira
  - UnityScript, Copyright © 2005 - 2008 Rodrigo B. Oliveira
  - OpenAL cross platform audio library, Copyright © 1999 - 2006 by authors.
  - libvorbis. Copyright (c) 2002-2007 Xiph.org Foundation
  - libtheora. Copyright (c) 2002-2007 Xiph.org Foundation
  - zlib general purpose compression library. Copyright (c) 1995-2005 Jean-loup Gailly and Mark Adler
  - libpng PNG reference library
  - Twilight Prophecy SDK, a multi-platform development system for virtual reality and multimedia. Copyright © 1997 - 2003 Twilight 3D Finland Oy Ltd
  - The Mono C# Compiler and Tools, Copyright © 2005 - 2008 Novell, Inc.
  - libcurl. Copyright (c) 1996 - 2008, Daniel Stenberg <daniel@haxx.se>.
  - PostgreSQL Database Management System (formerly known as Postgres, then as Postgres95)
  - FreeType. Copyright (c) 2007 The FreeType Project (www.freetype.org).
  - NVIDIA Cg. Copyright (c) 2002-2008 NVIDIA Corp.

Source: http://unity3d.com/unity/unity-end-user-license-2.x.html
Challenges to license analysis

- **Licenses**
  - Numerous license types, variants, versions
  - Incomplete
  - Hard to understand
  - Legally binding

- **License analysis**
  - May be intractable for developers, lawyers, etc.
  - May be constrained by time and resources
GAME CULTURE & TECHNOLOGY LAB

Mission  Events  Projects  Tools  Players  Package  Docs

Language

 upstream GCTL portal software. This open source distribution package is our little gift to those of you who may want to set up a collaboration infrastructure of your own. That’s right... believe it or not it’s FREE!!!

Here’s what the generic version will look like once installed.

Getting Face Lifted: 06.12.2009 v0.1.0

- MySQL/PHP-based Portal CMS (see the "Docs")
- Wiki (using MediaWiki)
- Weblog (using bBLog)
- NewsFeed (using pyGreengrocer)
- Document Version Control System (using DCM v2.0)
- Teleconference Suite (using Red5 Flash Server and BlueFire)
- Search Engine and Crawbot (using Sphinx)

Notes on Open Source Software and Open Architectures
Thomas Almmm, Rand Amsom, and Walt Scacchi
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liveuser@localhost:~$ ls
bin  dev  home  lost+found  mnt  proc  sbin  srv  tmp  var
boot  etc  lib  media  opt  root  selinux  sys  usr

liveuser@localhost:~$ ls /selinux
access  compat_net  initial_contexts  policies
avc  context  load  reject_unknown
booleans  create  member  relabel
checkreprot  deny_unknown  mls  user
class  disable  null
commit_pending_boots  enforce  policy_capabilities

deprecated

liveuser@localhost:~$
### Licname: Description

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>GPL 2</td>
</tr>
</tbody>
</table>
License Analysis

Necessary Rights but don't have:
Licensee may sublicense GUIDisplayManager under [GPL 2]
Licensee may sublicense GUIScriptInterpreter under [GPL 2]
Licensee may sublicense Local Server (Printer Server) under [GPL 2]
Licensee may sublicense Word Perfect under [GPL 2]
Licensee may sublicense mozilla under [GPL 2]
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License Firewall

- Blocks the propagation of reciprocal licenses
- Layer of connectors that surrounds a substructure
  - Dynamic links
  - Client server connections
  - License shims
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Open Architecture (OA) System

- Open Architecture
  - OSS or proprietary with open API
  - Overall system rights minimally allows use and redistribution
- Topology of components and connectors
- Configured subsystem or system
Components

- Software source code components
  - Standalone programs
  - Libraries, frameworks, or middleware
  - Inter-application script code (e.g., for building subsystems)
  - Intra-application script code (e.g., for Rich Internet Apps.)
- Executable software components (binaries)
- Software services
Connectors

- Communication
  - Application program interfaces (APIs)
  - Network protocols
  - Etc.

- License
  - Propagate license
  - Act as a license firewall together with a substructure
Different Licenses

- Rights and obligations regarding usage
- GPL (Gnu Public License)
  - Right to access, study, modify, and *reciprocal* obligation to redistribute modified source code
- Mozilla
  - Tri-license for its software like Firefox Web Browser:
- And many others!
License metamodel
Rights

- Copyright
  - Author has certain rights: use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies
  - Rights may be licensed individually to others
  - Obligations
Obligations

- Pay a fee
- Preserve the copyright and license notices (academic licenses)
- Publish your modified source at no cost (MPL)
- Publish all source code linked with (reciprocal license – GPL)
- Derivative works sublicensed under the same license (GPL, MPL, …)
- Collective works sublicensed under GPL regardless
Partial order of copyright actions

- **copy**
- **license**
- **modify**
- **use**

- **merge**
- **distribute unmodified**
- **sublicense**
- **modify and distribute**
- **modify and use**
- **use unmodified**

- **sublicense unmodified**
- **modify and sublicense**
Modality and Object

- Modality
  - Right
    - May or Need Not
  - Obligation
    - Must or Must Not

- Object
  - May be source, component, or other items within scope
Example license (BSD)

- **Right**
  - Licensee * may * distribute *Any Source* under *This License*

- **Obligation**
  - Licensee * must * retain the [BSD] copyright notice in [file.c]
Types of License Conflicts

- Unfulfilled correlative rights (or unfulfilled obligations)
  - For each right
    * Go through each obligation
      - Generate correlative right:
        » Must → may
        » Must not → need not
      - Check if correlative right exists

- Right-obligation conflict
- Obligation-obligation conflict
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OK
OA Design & License Analysis Environment

- Operational prototype OA design and license environment
- An extension to the ArchStudio Architecture Design Environment from UC Irvine
  - http://www.isr.uci.edu/projects/archstudio/
It is possible...

- To automate license analysis
  - Formal specification of licenses
  - Formal description of OA as xADL
- To analyze license interaction at different levels of granularity
  - Substructure level
  - System level
- To analyze license interaction across the different architecture levels
  - System to substructure levels
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- No endorsement implied.
Thank you!

Questions?