

Analyzing Software Licenses in Open Architecture Software Systems



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June 5, 2009

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.
 - PhysX physics library. Copyright © 2003-2008 by Ageia Technologies, Inc.
 - 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
 - jpeglib JPEG library. Copyright (C) 1991-1998, Thomas G. Lane.
 - Twilight Prophecy SDK, a multi-platform development system for virtual reality and multimedia. Copyright © 1997 - 2003 Twilight 3D Finland Oy Ltd
 - dynamic_bitset, Copyright © Chuck Allison and Jeremy Siek 2001 - 2002.
 - 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.

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

Applications Places System GCTL - Package - Mozilla Firefox

File Edit View History Bookmarks Tools Help

Logged in as: wait-scacchi - Slacker, 150 points

GAME CULTURE & TECHNOLOGY LAB

Mission Events Projects Tools Players Package Docs

English Search Advanced Search Language

prev - next ...

Package

Coming Soon! An updated version of the 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: 09/15/2008 VCP 1.0

- MySQL/PHP-based Portal CMS (see the "Docs")
- Wiki (using MediaWiki)
- Weblog (using B2evolution)
- News Feeder (using Gregarius)
- Document Version Control System (using DCM v2.0)
- Teleconference Suite (using Red5 Flash Server and Blab! Lite)
- Search Engine and Crawlerbot (using Sphider)

Calendars - Evolution

File Edit View Actions Search Help

New Send / Receive Print Delete Previous Today Next Go To Day

Search: Summary Contains

Show: Any Category

Monday 12 January

Tasks Summary Click to add a task

Memos Summary Click to add a memo

9 am

10 am

11 am

12 pm

1 pm

2 pm

3 pm

4 pm

5 pm

6 pm

7 pm

8 pm

Google

Walt Scacchi

On This Computer

Contacts

Birthdays & Annivers...

January 2009

Mon	Tue	Wed	Thu	Fri	Sat	Sun
29	30	31	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	1
2	3	4	5	6	7	8

Mail

Contacts

Calendars

Tasks

Memos

liveuser@localhost:/

File Edit View Terminal Tabs Help

```

ip6tables-multi          vgrepmove
ip6tables-restore       vgrepname
ip6tables-save          vgs
ipmaddr                 vgsname
iptables                vgsplit
iptables-multi          weak-modules
iptables-restore       ypbind
[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  policyvers
avc              context         load               reject_unknown
boolean         create          member             relabel
checkreqprot   deny_unknown   mls                user
class           disable        null
commit_pending_bools  enforce        policy_capabilities
[liveuser@localhost /]$
  
```

*OSS-OA-Notes-Jan09.abw


File Edit View Insert Format Tools Table Collaborate Documents Help

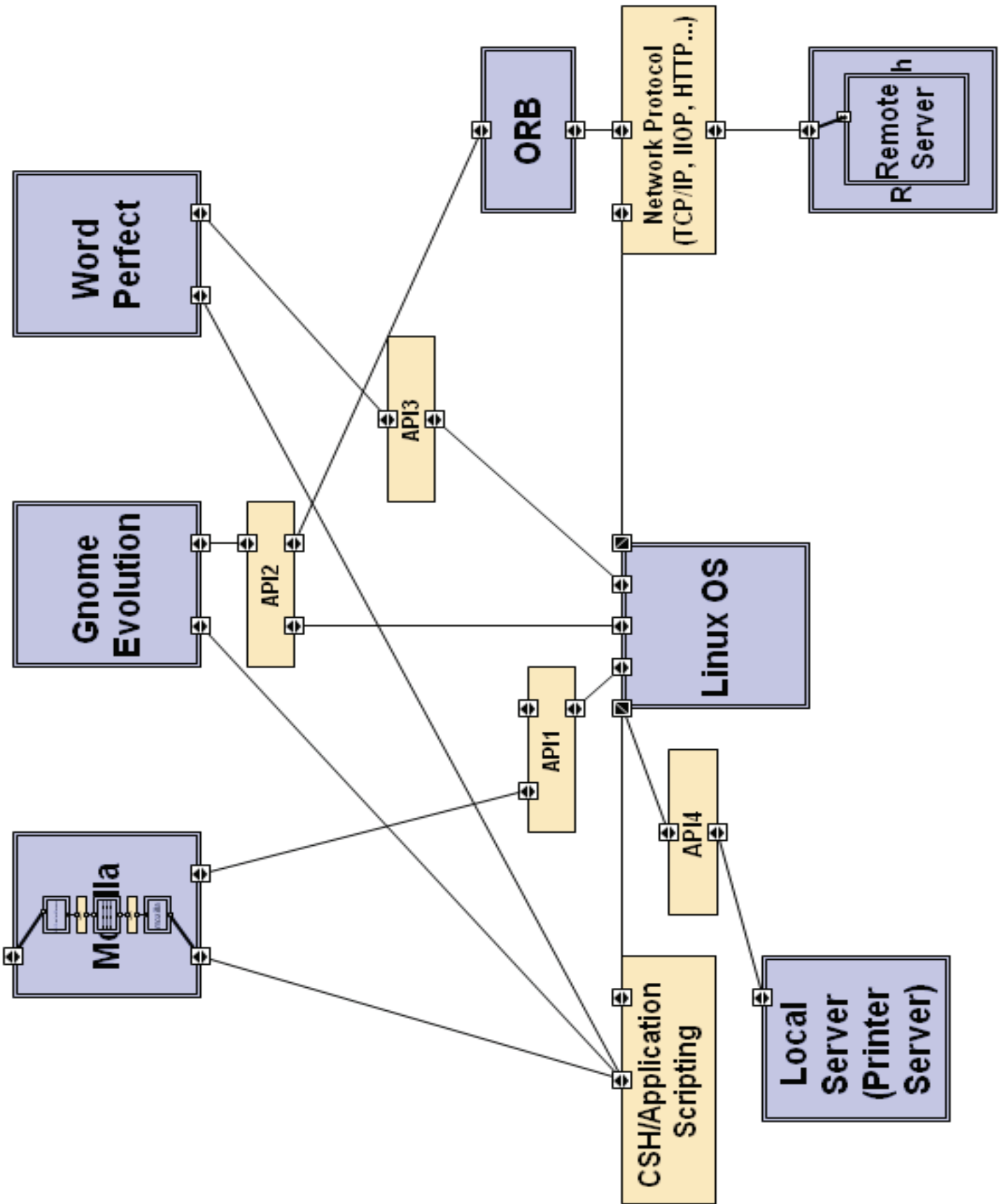
Normal Times New Roman 12 Page Width

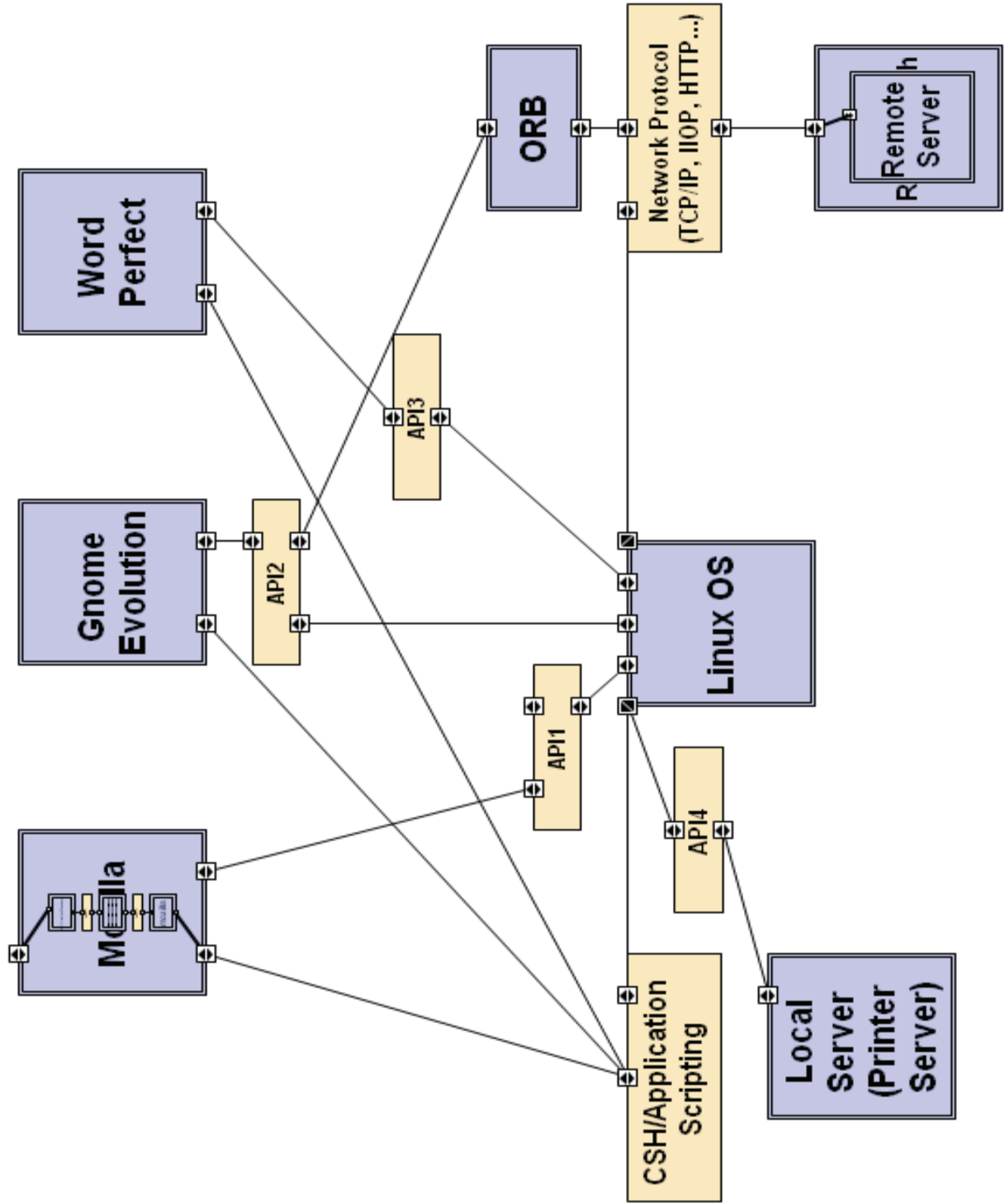
1 2 3 4

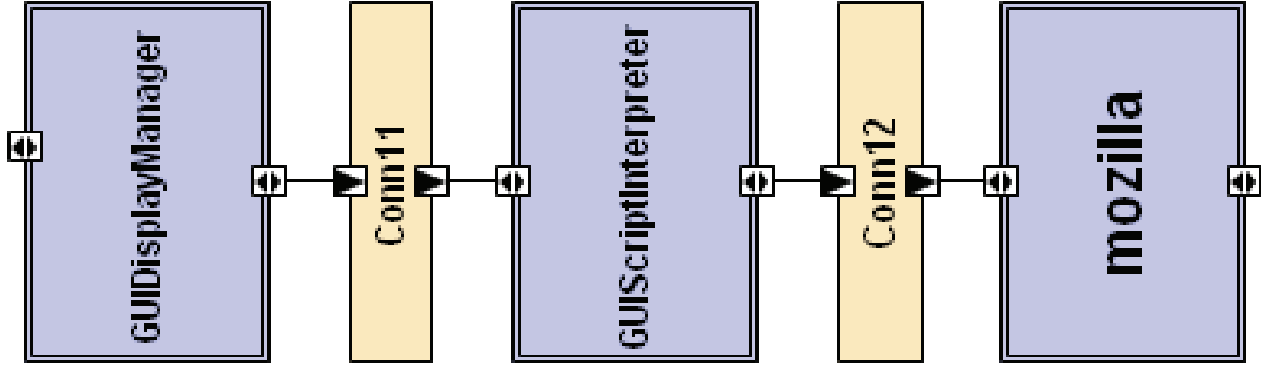
Notes on Open Source Software and Open Architectures

Thomas A. Spang, Hazel A. Sencion, and Walt Scacchi
January 2009









File Edit Navigate Search Project Run Window Help

ArchStudio 4

Traceability X Variability

New Tracelink Start Recording Recover Manual

Tracelink Details

Import Links Export Links

Tracelink Options Trace Analysis License Analysis

100%

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]

OK

Outline

- z_license/hci_2Level.xml
- Activity Diagrams
- Statecharts
- Structures
 - main
 - Mozilla SubArch
 - RS_Subarch
- Types
 - Component Type
 - MozillaComp
 - RemoteServ
 - Connector Type
 - Interface Types

ArchStudio 4 Launcher File Tracker View Archlight Notices Archlight Issues Archlight Repositories Console Debug

ArchStudio 4

Point mouse cursor at tool for more detail.


Navigator

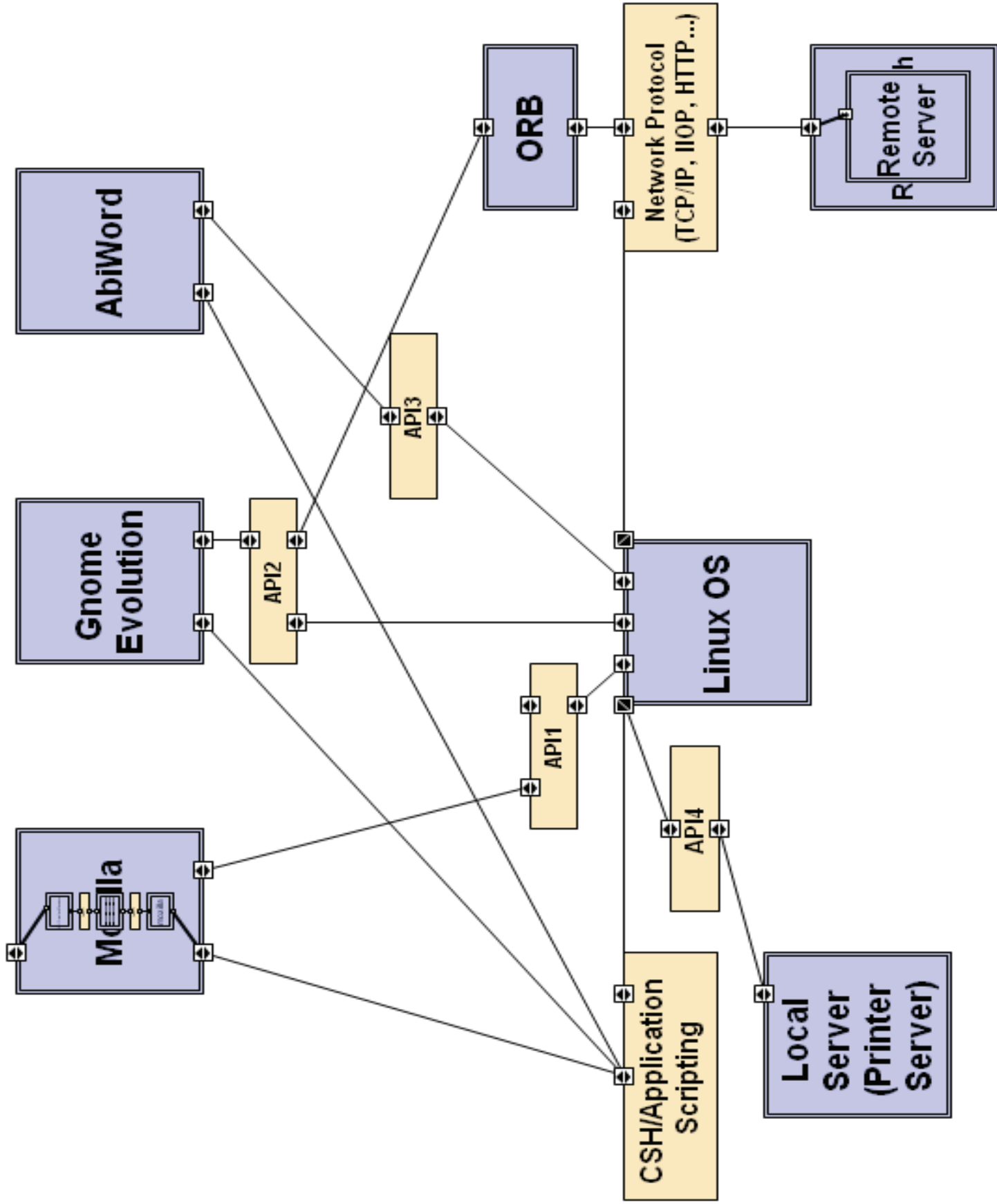
- HelloWorld2a
- license
- .project

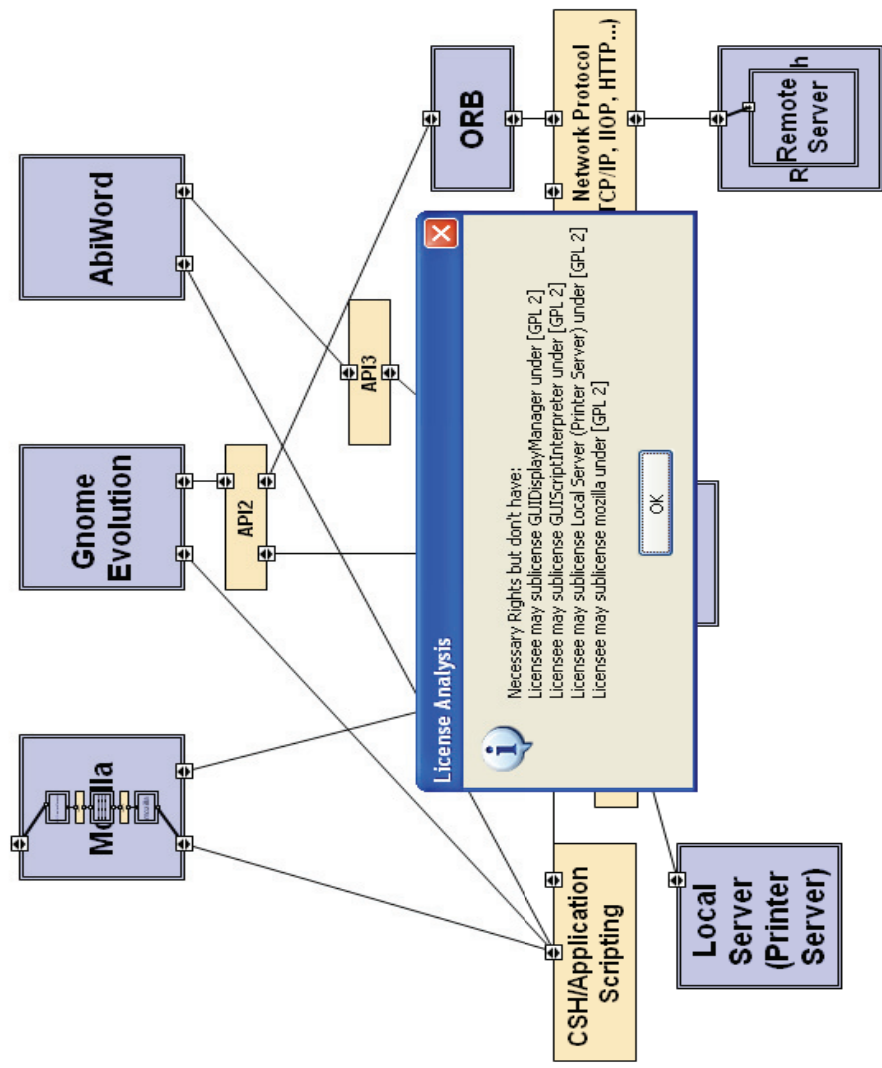
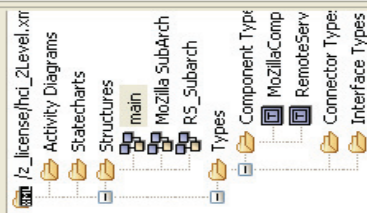
EA ISR A



License Analysis

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OK

New Tracelink

Start Recording Recover Manual

Tracelink Details

Import Links Export Links

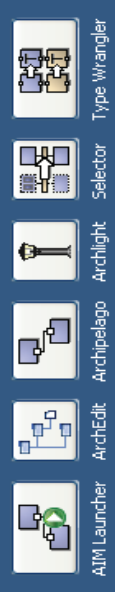
Tracelink Options

Trace Analysis License Analysis



ArchStudio 4

Point mouse cursor at tool for more detail.

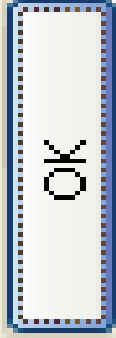




License Analysis



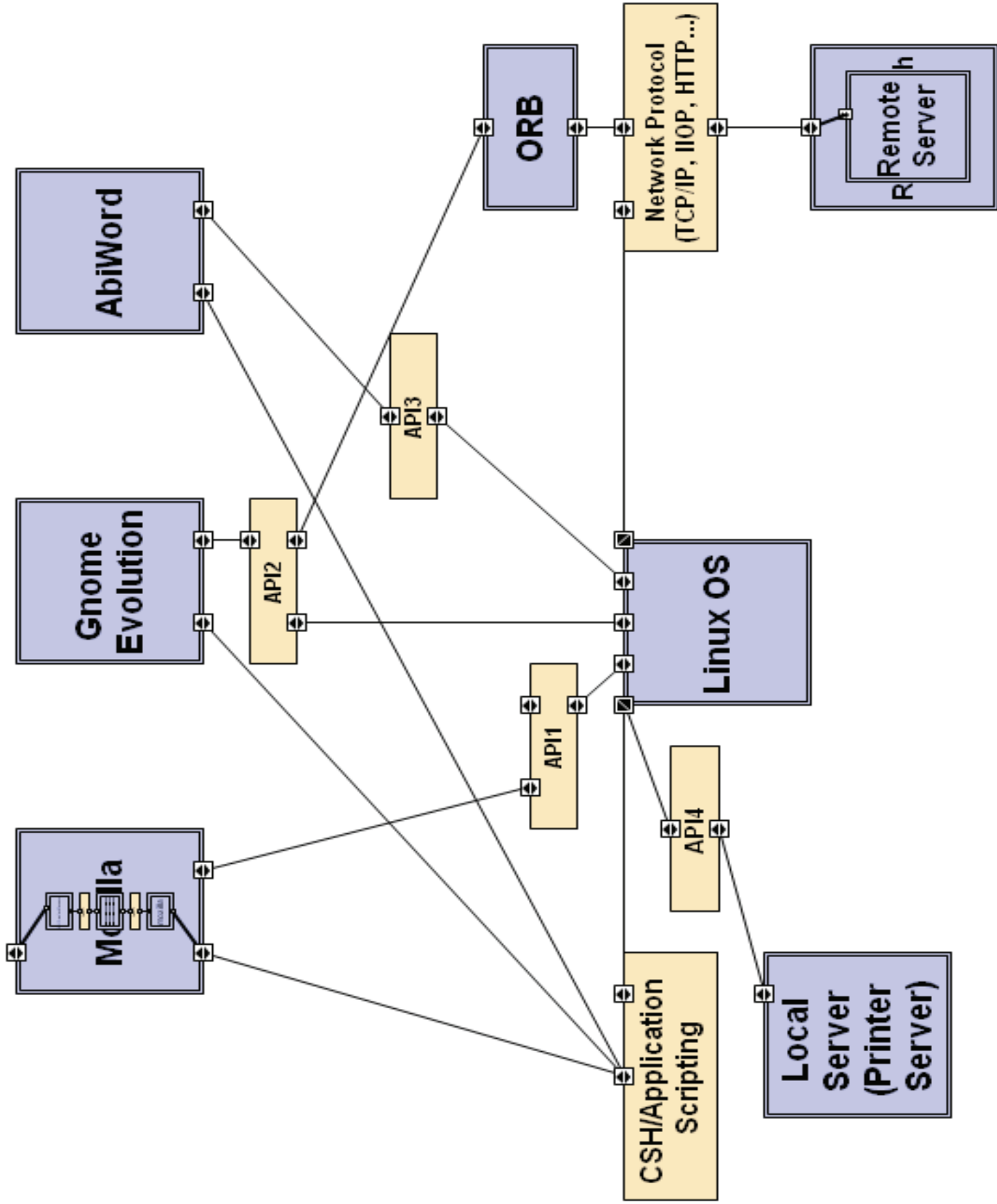
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Licensee may sublicense mozilla under [GPL 2]



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

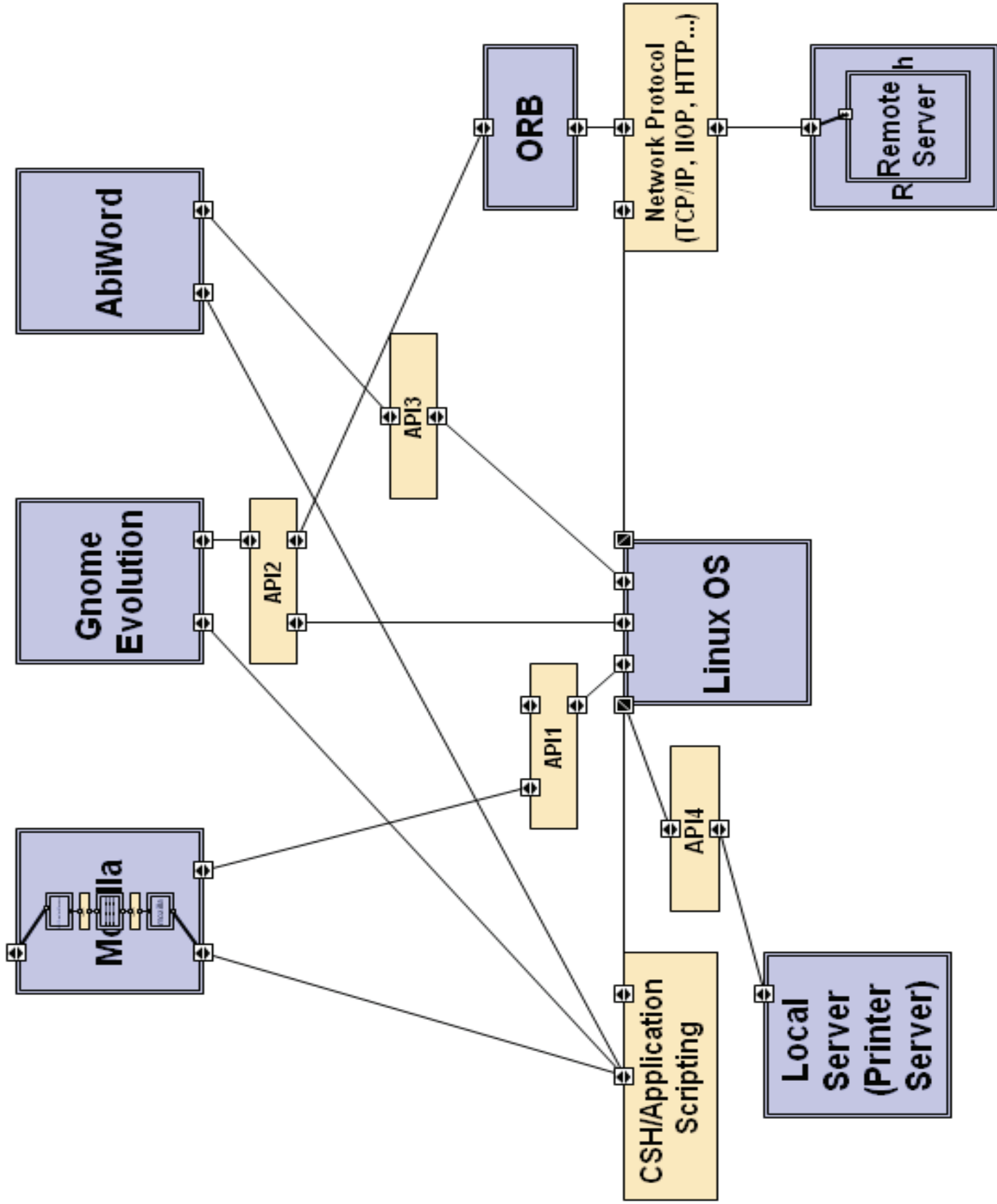


- **Software source code components**
 - Standalone programs
 - Libraries, frameworks, or middleware
 - Inter-application script code (e.g., for building subsystems)
 - Intra-application script code (e.g., for Rich Internet Apps.)
- **Executable software components (binaries)**
- **Software services**

Connectors



- **Communication**
 - Application program interfaces (APIs)
 - Network protocols
 - Etc.
- **License**
 - Propagate license
 - Act as a license firewall together with a substructure

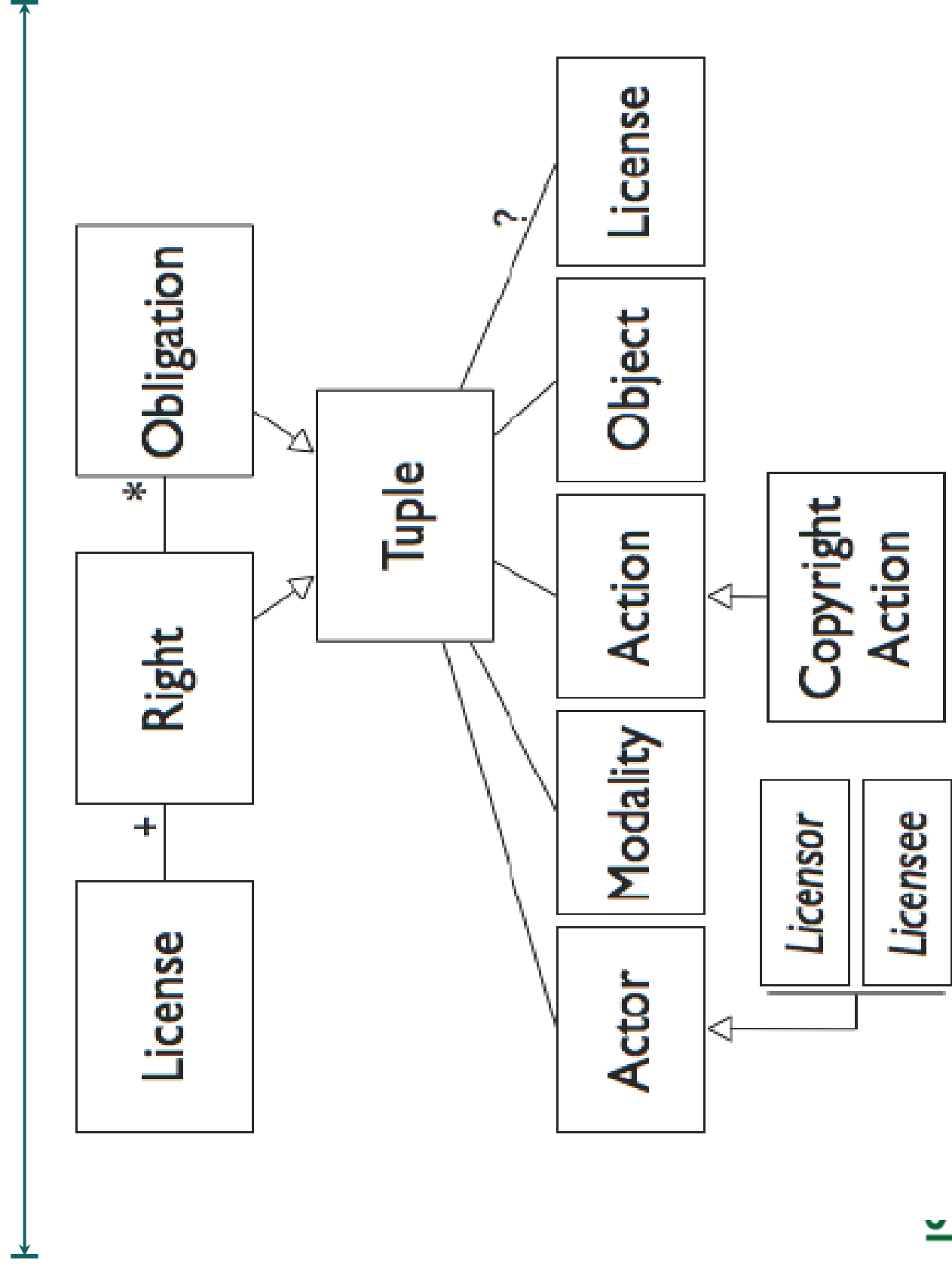


Different Licenses



- 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



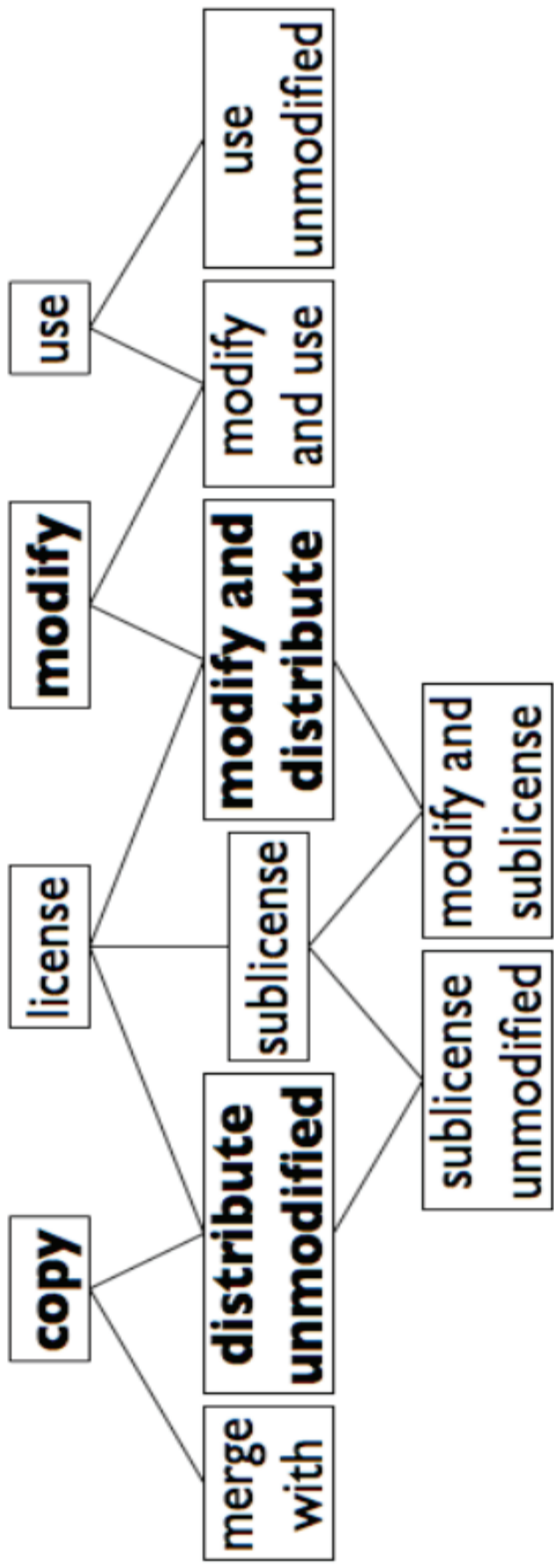
- Copyright
 - Author has certain rights: use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies
 - Rights may be licensed individually to others
 - Obligations

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



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



License Analysis



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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

Acknowledgements



- Research supported by:
 - Acquisition Research Program at the Naval Postgraduate School
 - Grants #0534771 and #0808783 from the National Science Foundation (NSF)
- No endorsement implied.

Thank you!



Questions?