

SE² Model to Support Software Evolution

Huzefa Kagdi, **Malcom Gethers**, Denys Poshyvanyk



Our SE² Model

- SE² - An integrated model for comprehensive analysis of Software Evolution, based on Semantic and Evolutionary information
- Past and present of software system leads to better evolution
 - single + multiple version analysis
- Developer Recommendation (DR), Feature Location (FL), and Impact Analysis (IA)


SE² - Primitives

- Semantic (conceptual) information captures the extent to which domain concepts and software artifacts are related to each other
- Evolutionary information is derived from analyzing relationships and relevant information observed from past changes by mining software repositories

SE² - Motivation

- Both conceptual and evolutionary information have been proven useful for software maintenance tasks
- Conceptual and Evolutionary information may complement each other while addressing a larger problem
- Conceptual and Evolutionary information may provide orthogonal insight to one another.

Developer Recommendation (DR)


KDE Bug Tracking System

[Home](#)
[Report New Wish or Bug](#)

Actions

[Reports](#)
[Requests](#)

Reports

[Bugs reported today](#)
[Bugs reported in the last 3 days](#)
[Bug reports with patches](#)
[Weekly Bug statistics](#)
[Most hated bugs](#)
[Most severe bugs](#)
[Most often reported bugs](#)
[Most wanted features](#)
[Junior Jobs](#)
[Report ownership counts and charts](#)

My Account

[New Account](#)
[Log In](#)

Bug 173881 - splitting views duplicates the tool op...

[First](#)
[Last](#)
[Prev](#)
[Next](#)
No search results available

Bug 173881: splitting views duplicates the tool options docker

Alias:
Version: 2.0 Beta 2

Product: koffice
 Priority: NOR

Component: general
 Severity: normal

Status: RESOLVED

Resolution: FIXED

Target: ---

Votes: 0

Description
[From Hanisch Elián 2008-10-30 07:01:32](#)

Version: 2.0 beta-2 (using 4.1.2 (KDE 4.1.2), Kubuntu packages)
 Compiler: gcc
 OS: Linux (i686) release 2.6.24-21-generic

when you split views, you get another tool options docker even if there's already one, this new docker has all options grayed out so it doesn't work. Splitting again creates another docker.

----- [Comment #1](#) [From Jan Hambrecht 2008-11-02 20:35:14](#) -----

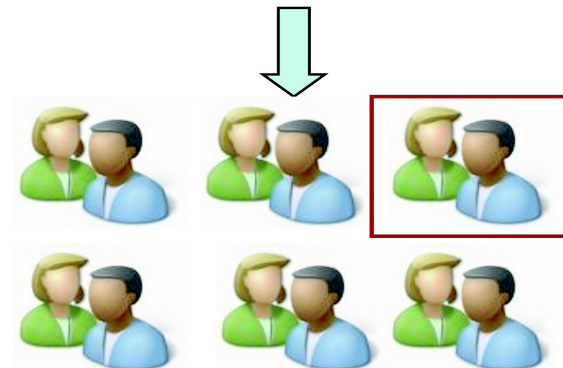
SVN commit 879228 by jaham:

fix duplication of tool options dockers when working in split view mode

BUG:173881

```

M   +1 -2      KoDockerManager.cpp
M   +18 -4     KoToolDockerFactory.cpp
M   +5 -2      KoToolDockerFactory.h
          
```

[illegible]

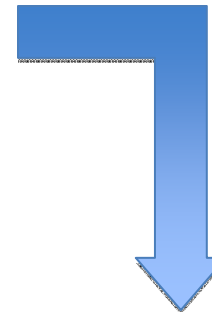
DR - Motivating Example

- KOffice bug #173881
“splitting views duplicates the tool options docker”



Concept Location in Source code with
Information Retrieval

Rank	Class Names	Similarity
1	KoDockManager	0.66
2	ViewCategoryDelegate	0.54
3	ViewListDock	0.51
4	KisRulerAssistantToolFactory	0.49
5	KWStatisticsDock	0.46



xFinder

Actual Fix on 2008-11-02:
a developer with the user id *jaham* and the
patch included the file *KoDockManager.cpp*.

Rank	File Experts	Package Experts
1	<i>jaham</i>	<i>mpfeiffer</i>
2	<i>boemann</i>	<i>jaham</i>
3		<i>zander</i>

Impact Analysis (IA)

Fix a bug



```
// reallocate
void Vector::reallocate(unsigned newsize, bool copy)
{
    // resize to the given size
    double* temptr = new double[newsize];
    // ...
}
```

Estimates



Approach



```
int main(int argc, char **argv)
{
    KAboutData about("helloworld",
        KAboutData::
        about.addAuthor( "Huzefa Kaghan",
        KCmdLineArgs::init(argc, argv,
        KCmdLineArgs::addCmdLineOptions(
        KApplication app;
        HelloWorld *mainWin = 0;

        if (app.isRestored())
        {
            RESTORE(HelloWorld);
        }
        else
        {

```

```
int main(int argc, char **argv)
{
    KAboutData about("helloworld",
        KAboutData::
        about.addAuthor( "Huzefa Kaghan",
        KCmdLineArgs::init(argc, argv,
        KCmdLineArgs::addCmdLineOptions(
        KApplication app;
        HelloWorld *mainWin = 0;

        if (app.isRestored())
        {
            RESTORE(HelloWorld);
        }
        else
        {

```

```
int main(int argc, char **argv)
{
    KAboutData about("helloworld",
        KAboutData::
        about.addAuthor( "Huzefa Kaghan",
        KCmdLineArgs::init(argc, argv,
        KCmdLineArgs::addCmdLineOptions(
        KApplication app;
        HelloWorld *mainWin = 0;

        if (app.isRestored())
        {
            RESTORE(HelloWorld);
        }
        else
        {

```

```
int main(int argc, char **argv)
{
    KAboutData about("helloworld",
        KAboutData::
        about.addAuthor( "Huzefa Kaghan",
        KCmdLineArgs::init(argc, argv,
        KCmdLineArgs::addCmdLineOptions(
        KApplication app;
        HelloWorld *mainWin = 0;

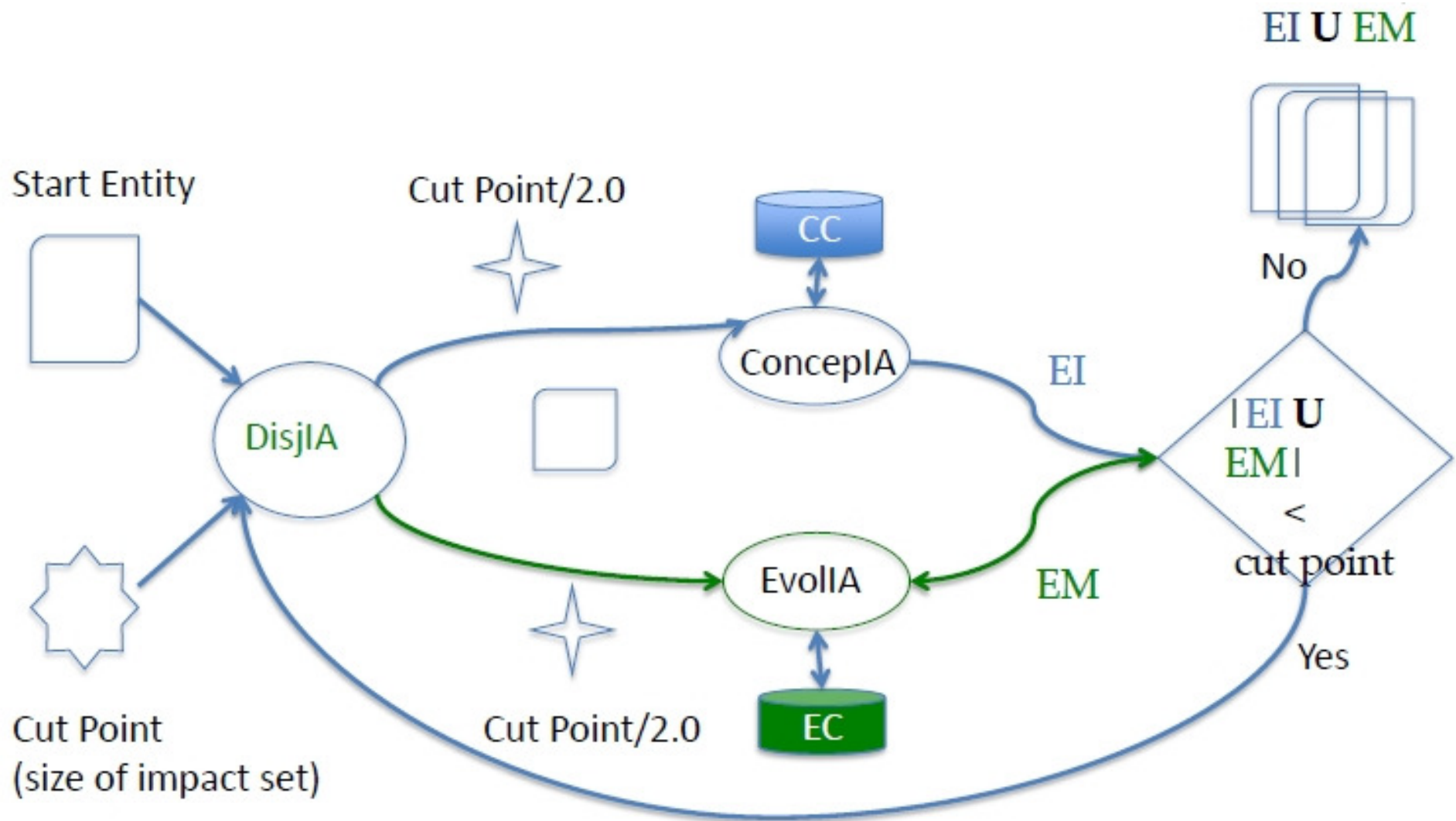
        if (app.isRestored())
        {
            RESTORE(HelloWorld);
        }
        else
        {

```



Impact Set

IA - Framework



IA - Motivating Example

- In *Apache httpd* commit# 888310 addresses the bug#47087
- Three source code files were changed

/modules/http/http_filters.c

/modules/http/http_protocol.c

/server/protocol.c

Rank	Evolutionary	Conceptual	Combined
1	<i>/server/protocol.c</i>	<i>/modules/http/byterange_filter.c</i>	<i>/server/protocol.c</i>
2	<i>/modules/proxy/mod_proxy_http.c</i>	<i>/modules/http/http_protocol.c</i>	<i>/modules/proxy/mod_proxy_http.c</i>
3	<i>/modules/debugging/mod_bucketeer.c</i>	<i>/modules/proxy/mod_proxy_ftp.c</i>	<i>/modules/http/byterange_filter.c</i>
4	<i>/server/core_filters.c</i>	<i>/server/core.c</i>	<i>/modules/http/http_protocol.c</i>
5	<i>/modules/http/byterange_filter.c</i>	<i>/include/ap_mmn.h</i>	<i>/server/core_filters.c</i>

IA - Motivating Example

- In *Apache httpd* commit# 888310 addresses the bug#47087
- Three source code files were changed

/modules/http/http_filters.c

/modules/http/http_protocol.c

/server/protocol.c

Rank	Evolutionary	Conceptual	Combined
1	/server/protocol.c	/modules/http/byterange_filter.c	/server/protocol.c
2	/modules/proxy/mod_proxy_http.c	/modules/http/http_protocol.c	/modules/proxy/mod_proxy_http.c
3	/modules/debugging/mod_bucketeer.c	/modules/proxy/mod_proxy_ftp.c	/modules/http/byterange_filter.c
4	/server/core_filters.c	/server/core.c	/modules/http/http_protocol.c
5	/modules/http/byterange_filter.c	/include/ap_mmn.h	/server/core_filters.c

IA - Motivating Example

- In *Apache httpd* commit# 888310 addresses the bug#47087
- Three source code files were changed

/modules/http/http_filters.c

/modules/http/http_protocol.c

/server/protocol.c

Rank	Evolutionary	Conceptual	Combined
1	<i>/server/protocol.c</i>	<i>/modules/http/byterange_filter.c</i>	<i>/server/protocol.c</i>
2	<i>/modules/proxy/mod_proxy_http.c</i>	<i>/modules/http/http_protocol.c</i>	<i>/modules/proxy/mod_proxy_http.c</i>
3	<i>/modules/debugging/mod_bucketeer.c</i>	<i>/modules/proxy/mod_proxy_ftp.c</i>	<i>/modules/http/byterange_filter.c</i>
4	<i>/server/core_filters.c</i>	<i>/server/core.c</i>	<i>/modules/http/http_protocol.c</i>
5	<i>/modules/http/byterange_filter.c</i>	<i>/include/ap_mmn.h</i>	<i>/server/core_filters.c</i>

Conclusions

- SE² provides improved support for Support Evolution and Maintenance
- Semantic (conceptual) and evolutionary information sources are orthogonal with mutual benefits
- There is a value in combining single and multiple version analysis techniques