Measuring developer activity. Motivation and some approaches

Juan José Amor Iglesias
Universidad Rey Juan Carlos
jjamor _at_ gsyc.escet.urjc.es

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Summary

- Free/Libre Open Source
- Motivation
- Tracing activity
- Interactive traces
- Automatic traces
- Conclusions

Free/Libre/Open Source

OSD Model. Main features:

- License for use, distribution, modification.
- Source code available
  - Anybody can access source code, to see it, improve it and also take part in "official" development.
- Collaborative and geographically distributed development
  - Needed tools for:
    - Remote access to source code
    - Version control
    - Bug tracking
    - Developer discussion (mail lists, forums) ...
    - (generally) **all publicly available**

Libre software engineering

- Libre software gives us lots of public data:
  - Version control (CVS, SVN)
  - Bug tracking (Bugzilla)
  - Mailing Lists (mailman)
  - . . . etc . . .
- These data can be analyzed in order to comprehend how libre software process works.
- Software Engineering wants to comprehend software process.
- In several fields. Now, we focus our interest in effort estimations.

Tracing activity: motivation

Classic effort estimations:

- Examples: COCOMO, SLIM . . .
- Based on a metric: software size (usually SLOC)

Libre software efforts. Time spent in:

- Coding
- Mailing
- Managing bugs
- . . . etc . . .

How can we measure those activities?
How can we estimate effort?

Tracing activity: motivation

- Effort (and software cost) depends on activity:

$$effort = g(activity) \Rightarrow cost = f(g(activity))$$

- Ideally, effort depends on each type of activity:

$$effort = g(activity) = a \cdot h(CVS) + b \cdot j(ML) + c \cdot k(BTS) + d$$

- Problem: how to define functions h, j, k, and rest of variables.
- Solution: Compare traced activity with information about time spent.
- Traced activity: through tools such as CVSAnalY, MLStats, etc
- Real time spent by developers: we need new tools for that.

Tracing using "polls"

- The idea is to tell developers to fill a survey every day.
- It might be a form, with several questions, such as:
  - How many hours did you work today?
  - Please, classify your activity today:
    - Editing source code:
    - Managing bug reports:
    - E-mail related to work:
    - etc

Tracing using "popups"

- The idea is, for each time interval, to launch a popup to user with a question such as:
  - What are you doing now?
- For easier processing, the question might be a selection set such as:
  ☐ Editing source code
  ☐ Managing bug reports
  ☐ E-mail related to work
  etc

Automatic traces

We are coding a tool for automating traces on a graphical desktop:

- For each time interval (a few seconds), it logs the current focused window (application name and window title)
- Log is filtered for user privacy. However sometimes we will need data about developer identification.
- Log is daily sent to our server.

Automatic traces

Doing the traces

- Based in "timeline" tool which can be found in GNOME CVS.
- It captures current focused window name and title, by using XLib calls
- It only works with X-Window based desktops (such as GNOME or KDE).

Automatic traces

Filtering traces

- Traces must be filtered to preserve privacy.
- Heuristics:
  - Detect and remove username in window titles (for example, x-terminals)
  - Detect and remove private activity without interest (for example, navigation details while using a web browser)
  - etc

Automatic traces

Sending traces

- Once a day, filtered traces are sent to our server.
- For privacy, we identify the clients with an unique Id generated while installing tracing tool.
- However, sometimes we will need to identify developer, in order to compare her productivity with time spent in traced activities.

Automatic traces

Tracing sample

Gnome-terminal	Terminal	active	3	1138103360	1138103363
Dialog	tracedt Message	active	14	1138103363	1138103377
Gnome-terminal	Terminal	active	52	1138103377	1138103429
Emacs	emacs@arette.home	active	43	1138103429	1138103472
Gnome-terminal	Terminal	active	4	1138103486	1138103490
Gnome-terminal	devel@arette:...e-python/pygobject	active	5	1138103494	1138103499
Gnome-terminal	jhbuild: Configuring gnome-python/pygtk [21/97]	active	3	1138103503	1138103506
Liferea-bin	Liferea	active	9	1138103510	1138103519
Gaim	Login	active	5	1138103519	1138103524
Gaim		active	5	1138103524	1138103529
Evolution	Evolution - Mail	active	9	1138103572	1138103581
Evolution	**(private mail)**	active	138	1138103581	1138103719
Evolution:composer	Attach file(s)	active	7	1138103719	1138103726
Evolution	**(private mail)**	active	33	1138103726	1138103759
Evolution:composer	Attach file(s)	active	10	1138103759	1138103769
Evolution	**(private mail)**	active	33	1138103769	1138103802
Evolution	Evolution - Mail	active	18	1138103802	1138103820
Liferea-bin	Liferea	active	3	1138103833	1138103836
Gnome-terminal	Terminal	active	7	1138103836	1138103843
Gnome-terminal	Root	active	7	1138103843	1138103850
Gnome-terminal	jhbuild: Building gnome-panel [23/97]	active	2	1138103850	1138103852
Gnome-terminal	Terminal	active	14	1138103852	1138103866
Nautilus	audio - File Browser	active	10	1138103866	1138103876
Gnome-terminal	Terminal	active	9	1138103876	1138103885
Liferea-bin	Liferea	active	34	1138103885	1138103919
Xchat	**X-Chat [2.4.4]: (private chat)**	active	6	1138103919	1138103925
Firefox-bin	**(private browsing)**	active	2	1138104234	1138104236
Firefox-bin	**(private browsing)**	active	8	1138104236	1138104244
Liferea-bin	Liferea	active	36	1138104244	1138104280
Xchat	X-Chat [2.4.4]	active	2	1138104280	1138104282

Conclusions

- New data sources for effort estimation: not only project size.
- Tracing tools: interactive and non-interactive.
- Utility of tracing developer activity for:
  - Correlate time spent with productivity.
  - Effort estimations.
- To be discussed with developers:
  - Convenience of non-interactive tools.
  - Privacy issues.
  - etc...

In a very early stage of development...

We are waiting your feedback...

jjamor (at) gsyc.escet.urjc.es

- Would you like to be "traced"?
- Do you suggest privacy, etc improvements?
- Any other suggestions welcome!
- Please, write me!